The Builder.

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Alphabets: Old and New.

THE chief practical value of Mr. Day's little book under the above title* consists, no doubt, in the considerable number of examples appended to it, on a tolerably large scale, which will form a useful repertory for suggestions or models for adoption. But they are selected also with another purpose—that of showing the development of letter forms and the shape they took at different periods.

In the essay on "Art in the Alphabet," which forms the literary portion of the book, the author observes that there are two conditions on which the artist may be permitted to tamper with the alphabet; "whatever he does ought, in the first place, to make reading run smoother, and, in the second, to make writing satisfactory to the eye"; and he adds that neither of these ends should be sought at the expense of the other. If so, architectural draughtsmen must tremble to think what a large proportion of their efforts in decorative writing are under a ban. Artists, in fact, in dealing with the alphabet, have not in general kept before them the object of ready legibility. William Morris may have sincerely thought that the thick black lettering of the Kelmscott Press publications, with the page spotted with little ornaments in place of full stops, was plainer to read than the ordinary type of the day; but we think the eyes of his readers will have registered a good many votes against him.

A distinction must be drawn between type which is intended for use on the page of a book, and lettering which is intended for an inscription or heading on a monument or a building, or on a drawing or a title page. In the former case nothing ought to be allowed in the design of the type which interferes with ease in reading. But in the latter cases we do not think it is by any means necessary that the lettering should be such as to be easily legible at a glance. An inscription or heading is usually a short sentence; the object in making a special design for the letters is, while giving the required information, to give it in a decorative manner, and to make it a portion of the design of the whole; and where the artistic effect is satisfactory there is even a certain pleasure and interest to the spectator in deciphering the words, in coming on a partially hidden meaning in what at first sight appears to be a merely decorative addition. When it comes to the printed page for general reading, it is another matter; there clearness is the first requisite, and everything else should be subordinate to it.

This quality is to be attained, Mr. Day observes, by marking in each letter whatever is characteristic of the letter, developing what is peculiar to it, lopping off anything which tends to confound it with another; in all which we concur. The adoption of this sound and sensible rule, however, necessarily tends to render the type, in its general effect, less characteristic than it might otherwise be; it is reduced to a utilitarian level. The artistic element comes in, however, in the minutiæ of design of the letters. The general form of a letter may be deprived of some of the freedom and boldness of character which it might have if legibility were not in question; but after the general design has been settled, there is a great deal of delicate distinction in the modelling of the extremities and curves of the letter; a more delicate and careful design in these respects imparting a refinement to the type which is hardly realised (unless with a magnifying glass) in contemplating a single letter, but which has a very important effect on the character of the printing when it is contemplated as a whole page, or even as a section of a few lines of type. On this point we have already spoken when reviewing Mr. Strange's book on Alphabets some years ago.

The European alphabet of to-day is essentially Greek, derived through Roman, and to our thinking shows little or no signs of pictorial origin, though Mr. Day speaks of it as a kind of "degradation" from picture-writing:—

> "The Greeks had no longer (as the Egyptians had) any signs to represent syllables, that is to say combinations of vowels and consonants, but they grafted into the old Pelasgian or native alphabet (whencesoever that may have been derived) sundry new letters necessary to express new words, borrowed from the Phœnicians. Naturally they took the letters also from them. These same Phœnicians had probably adopted from the Egyptians signs to express foreign sounds new to their own language, without knowing or caring anything about the pictorial origin of such signs. There was no reason why they should not modify what they regarded as arbitrary expressions of sound values, and every reason why they should reduce them to the very simplest and most conveniently written shape—which they did; and so it comes about that we to-day are in all probability directly indebted to ancient Egypt for at least a portion of our alphabet, far removed as it may be from the hieroglyphics of the Pharaohs."

That is, we are aware, a currently accepted idea; yet the more we reduce the Greek alphabet to its simplest forms, the more, it seems to us, the letters partake of merely geometrical character. This is very well illustrated in the Greek alphabet from a stele of the fourth century B.C., given as the first of the collected examples at the end of Mr. Day's book. It seems to consist entirely of varied combinations of straight lines and circles. Is there not a radical difference between signs which represent a word, and consequently an idea, and signs which only constitute the raw material for making up words, the arbitrary diagrams for various labial actions? We read in another author that "our letter *m*, which in Hebrew was called *mim*, 'water,' has still a considerable resemblance to the zigzag wavy line which had been chosen to represent water, as in the zodiacal symbol for Aquarius." But then the Hebrew letter itself has not this resemblance, which on the theory it ought to have. The Greek small μ has, but when we see the Greek capitals L M N together in Mr. Day's alphabet from the stele, just referred to, one cannot but see that they are all a variation of one diagram. Λ (L) is the simple form of it; M is the same figure

*"Alphabets, Old and New." By Lewis F. Day. London: B. T. Batsford; 1898.

1. 30. ROMAN. FROM SCULPTURES IN THE BRITISH MUSEUM. A.D. 150 TO 300.

Fig. 1.

76. ITALIAN. G. F. CRESCI. 1570.

Fig. 2.

84. ENGLISH. CHIPPENHAM. INCISED. 1697

Fig. 3.

98. CASLON TYPE.

Fig. 4.

60. ITALIAN. SERLIO. 16TH CENTURY

Fig. 5.

120. PATTEN WILSON.

Fig. 6.

doubled; N is one and a-half of it. We are strongly inclined to the impression that the connexion of the Greek alphabet with picture-writing is more a fancy than a fact; or at all events that the picture-writing origin, if it existed, is so remote and so elementary as to be entirely prehistoric.

The earlier form of Greek and Roman alphabet, as Mr. Day notes, was evidently influenced by the fact of its being largely used for inscriptions cut in stone or engraved on metal. The Roman alphabet, fig. 1, is a good example of this; it is simple and broad in character, and such as would lend itself readily to the process of cutting on stone. The process of writing in manuscript naturally led to an easing and rounding off of the forms of the letters, so as to facilitate their formation with the pen; and thus the forms of our printed letters may be said to be the result of the Roman cut letter modified by the conditions of penmanship. Mr. Day says:—

"Our own 'lower case' we get more or less directly from Charlemagne. He found, or perhaps his friend the Pope told him, that writing had degenerated by the time he came to the throne (A.D. 800) to a state unworthy of a mighty emperor. Accordingly he ordained its reformation. He went so far as to compel bishops and other important personages who could not write decently, to employ scribes who could. In this way he revived the small Roman character, which we eventually adopted for our printed type."

But though the manuscript forms were shaped by the considerations of the convenience of writing, and the printed forms in the first instance imitated them, Mr. Day urges that as in printed type no such consideration intervenes, we might very well in the present day revise our type forms, and study to render them a better combination of beauty with legibility. One can hardly think that any marked change in the general form of printed letters would be accepted by the world; all we think that can be done is to refine the design of type, while preserving the same general appearance of the letters. There is no doubt a great deal of type in ordinary use in the present day which is very poor in design; while in books carefully printed and with a desire for artistic effect there is, on the other hand, a return frequently made to the style of letter of some of the best printers of the sixteenth and seventeenth centuries. These types, once made, are, of course no more costly to print from than the most ordinary type used for newspapers. The most feasible aim seems to be get these more refined forms of type popularly accepted, and to create a demand for them on the part of readers. It may be questioned whether we shall improve much on such a type for capitals as the Caslon type shown in fig. 4.* The Chippenham capitals in fig. 3 are very elegant; the "lower case" of the same type seems rather too busy and curly in style to be quite satisfactory when viewed as a whole page; the forms of p, w, and y, especially, are too *prononcé* and differ too much in line from the remainder of the letters. The Cresci example (fig. 2) is a better form for general use. This, as we gather from the notes to the list of illustrations, is a written alphabet, but it would make a very good type form. The Serlio alphabet of capitals (fig. 5) is a bold and fine set, but a little deficient, to our thinking, in coherence of style; the bold treatment, for instance, of the left-hand terminations of the M and N seems out of keeping with the decidedly weak treatment of the L, and the long extension of the tail of the Q is also a kind of excrescence, out of keeping with the other letters. The C is very well treated. Mr. Patten Wilson's alphabet of capitals (fig. 6) shows fine free design; the H, however, might be liable to be mistaken for A, and we do not very much like the form of the S, though no doubt there is character in it.

The collection of historic designs of alphabets is of great interest, and shows how many variations may be played on the form of a letter while leaving it still recognisable; and they also afford interesting examples of the influence of the writing-tool on the character of the letter—the difference between brush-letters and pen-letters. Mr. Day has amplified this point by giving several modern designs, mostly his own, for alphabets to be executed in special materials and methods — needlework, sgraffito, gesso, beaten metal &c. These show a great deal of character derived from the suggestion of the material and the manner in which they require to be worked. We do not quite

* These examples are considerably reduced from the sizes in Mr. Day's book.

like the one for wood-carving, showing ribbon letters in low relief; ribbon letters generally are to our thinking a false taste. The author's large size capitals, Nos. 119 and 120, apparently executed with the brush, have a fine quality and freedom of line. The book is an excellent one, and deserves the attention of all those who are interested in the decorative aspect of printed type.

A NEW POLICY IN GAS SUPPLY.

THE circular recently issued by the High Wycombe Gas Light and Coke Company to residents within the area supplied by this company is of considerable interest to gas consumers in general, inasmuch as the policy therein announced marks the advent of what may be considered as practically a new era in the history of the gas industry.

Not merely is that supervision of consumers' fittings by the officers of the gas company, which we have advocated is previous issues, about to be undertaken free of charge, but, in the words of the circular, "the company is prepared upon receipt of request or by periodical inspection to keep and maintain all ordinary fittings in a clean and efficient order, and will renew all ordinary burners when necessary (free of cost), and supply and fix mantles for incandescent burners at a cost of 10d. each."

For workshops the company is also prepared to "lay on supplies and fix internal fittings suitable for each respective supply," free of cost, and for consumers requiring motive power to "supply gas engines either on the hire-purchase system, payments quarterly, or on the continuous hire system."

The policy of supplying burners and cooking stoves to consumers free of charge has recently been adopted in several provincial towns, such as Blackpool, but the circular from High Wycombe indicates a bolder spirit of enterprise than has yet been shown elsewhere, and much credit is due to Mr. J. F. Wicks, the manager to this company, as a pioneer of a system which will undoubtedly become general throughout the country in the immediate future, and which will certainly increase the popularity of gas among ordinary householders.

Gas engineers well know that the value of gas to a consumer is largely dependent upon the condition of his service pipes and the form of appliance employed for consumption of the gas; and the average consumer cannot in reason be expected to know the diameter of the pipes he should employ, the position in which the pipes should be located, or the appliances required in order to obtain the greatest efficiency from the gas consumed. These matters fall naturally within the gas engineer's domain of study, and it is marvellous that for so many years the gas manager has so often been content to leave the consumer to the mercy of the local plumber or ironmonger, to the ultimate detriment of the gas company.

Under the old system the gas company did not interfere with any fittings upon the consumer's side of the meter; these fittings might be of such inferior manufacture, or so badly connected together, as to induce the would-be consumer to reject gas altogether in favour of a less costly or less dangerous illuminant. But spurred on, no doubt, by the competition of the deservedly popular but costly electric light, there are evidences in all directions that the old policy of encouraging consumers to waste gas is to be abandoned, that no longer will the companies leave their product in the hands of fitters over whom they have no control, that consumers will be shown how to use the gas most economically, and how to use it most effectively for cooking, for warming, for heating the water for the wash-tub or the bath, for ironing, for ventilation, and for lighting. By the periodical testing of fittings, the annoyance created by gas escapes from leaky fittings will be reduced to a minimum; and by the gratuitous, or cost price, distribution of efficient appliances the use of wasteful and unsightly gas flames will be discouraged.

All this "free of charge" business must of course be paid for eventually in the price paid for the gas, but if the companies continue to supply the appliances and fittings at practically cost price, then the consumer will at least save the profits of the local ironmonger, and the consumer will not be induced to buy a wasteful appliance by a retailer who is influenced entirely by his rate of commission.

The fact that a number of alluring novelties in the form of self-lighters, mantles of new form, and burners and mantles at a much reduced cost are to be placed on the market during the coming winter, added to the rumour that coal is to be unusally dear, gives the gas manufacturer the prospect of an unusually heavy demand for gas in the near future, and it is to be hoped that he is prepared to meet it without having resort to that reduction of gas pressure in foggy and frosty weather which is so exasperating to the consumer. It is in such weather that gas stands upon its trial, and in spite of the cost, the holders should be of sufficient capacity to allow of an increased, rather than a diminished, pressure upon such urgent occasions. With the aid of water-gas plant, this is by no means impracticable.

Cheap gas, and the adoption of a policy resembling that of High Wycombe, together with a rise in the price of coal, will do more to reduce the blackness of town fogs than can at the present moment be expected from any other practicable scheme. It is true that the sweep would lose his means of livelihood, but the cost of maintaining him in idle affluence would not amount to a tithe of the sum saved in soap and labour expenses by the consequent reduction in the number of solid carbon particles commonly present in a town atmosphere.

MUNICIPAL ENGINEERING IN CHICAGO.

IN connexion with a reorganisation of the sewerage system of Chicago, some extensive engineering works are now in progress. As originally planned, nearly all the sewers in this city discharged into the Chicago river, only three emptying into Lake Michigan. In course of time, however, the number of those following the latter direction has been so largely increased that in 1896, the Pure Water Commission was appointed for the purpose of reporting upon the best means of diverting the sewage outfalls into the river. A report was forthcoming in 1897, when the commission recommended that two of the sewers should be rebuilt with a reversed grade so as to discharge towards the river that two intercepting sewers, one four and a half miles long, should be built along the lake shore, communicating with two large conduits to be made in Thirty-ninth-street and in Lawrence-avenue, the former of these draining into the south and the latter into the north branch of the river. When it is stated that each of these conduits will be about two miles in length, and of 20 ft. and 16 ft. diameter respectively, some idea of the proportions of the work may be gathered. According to law, capacity sufficient for the passage of a large volume of pure water must be provided, and supplies for this purpose will be drawn from the lake. One conduit is designed to deliver a minimum of 250,000 gallons of lake water and 43,750 gallons of sewage per minute, whilst the other is intended to carry about 219,000 gallons of water and nearly 20,000 gallons of sewage in the same period. Owing to differences of level, pumping stations capable of dealing with large volumes of water are also to be erected at suitable points. Speaking first of the tunnels, it should be mentioned that the depth and width of trench necessary, made it doubtful whether open cut conduits could be formed without endangering the stability of buildings along the route. After inquiry it was decided that the greater part of each conduit might be tunnelled by the aid of shields specially adapted for the purpose. Along the course of the ducts, the material to be excavated consists principally of soft blue clay, wet yellow sand, blue quicksand, ordinary sand, and loam. Two contracting firms are engaged in tunnelling operations, and two distinct types of apparatus are in use. On the Thirty-ninth-street route the "Chicago" boring shield has been selected. Its external diameter is 24 ft. 10 in.; the length over all being 14 ft. The working portion is about 10 ft. long, and consists of outer and inner shells, fixed 2 ft. apart. The cutting edge of the outer shell is bevelled, whilst the front of the inner shell is curved to meet the outer shell just behind the cutting edge. Twenty-four hydraulic jacks for pushing the shield forward are arranged in groups around the circumference, each jack having a capacity of 125 tons under a pump pressure of 5,000 lbs. per square inch. Flexible feed pipes are connected to each group of pumps, so that the shield may be advanced 15 feet before another length of pipe has to be added. Planks, 6 in. by 2 in., form the outer lining of the tunnel, and inside the lining are five rings of brickwork. A shield of entirely original design has been constructed for use in the Lawrence-avenue tunnel, and it seems to incorporate some features worthy of notice. Briefly described, the machine has a shield proper, and a tail piece serving to support the roof until the brick lining is in place. The shield is built of cast-iron rings, with a large central opening through which excavated material is removed. In front of the shield a cutting tool is supported on three arms, fitted so that the width and depth of cut can be modified as required. In the ordinary way the path of the cutter is a spiral, extending from the outer edge to the centre of the bore. Sufficient flexibility is furnished by the construction of the shield to permit of curvilinear progression in any direction. Driving power is furnished in the present works by wire rope transmission,

but independent engines may be attached to the machine for direct driving should this be preferred. Material cut from the face of the bore in advance of the shield is gathered up by buckets connected to the face of a large geared ring-wheel within the outer envelope of the shield. From the buckets excavated material is deposited into the hopper of a conveyor extending back far enough to transfer the earth to cars running on rails, which establish communication with the shaft. In the cutting of tunnels for the Central London Railway and in similar works, it has been necessary for the core, in advance of the shield, to be excavated by manual labour, whilst the shield has only executed a final cut of moderate thickness at the periphery. As an example of a boring appliance in which manual labour is practically superseded, the new machine seems to mark a decided advance.

Turning now to the pumping stations, it will be seen that the conditions are different in the case of each conduit. Consequent on the opening of a new drainage canal, also forming part of the general scheme, the water level at the junction of the south branch of the river will be permanently lower by about 18 in. than the lake level. There will, therefore, always be a down gradient in the Thirty-ninth Street conduit, from the lake to the river. As, however, sewage flowing towards the conduit from the south is at a lower level, it must be pumped, and the necessary machinery will be situated at the point of function near the lake. This arrangement will ensure free delivery and reduce deposition during dry weather, besides facilitating control in times of storm. Considerable variations of head are anticipated, and the main pumping engines are therefore to be contrived so as to be available for either high or low duty. Smaller engines will also be employed for dealing with dry weather flow. In the Lawrence-avenue conduit the pumping station is to be placed at the river outlet, sufficient water from the lake being admitted to maintain requisite velocity in the various channels. The works we have briefly sketched represent a scheme of reform as comprehensive as it is praiseworthy, and one which, by its magnitude, may serve to aid those whose opportunities for travel are limited in forming more correct views as to the state of development reached in the New World.

NOTES.

The Athenæum Club Alterations.

WE find that Mr. Collcutt considers himself to have been gravely misrepresented in the article on this subject in our last issue; and in justice to him we willingly publish his own statement as to his position in the matter, which is as follows:—

1. When Mr. Collcutt agreed to undertake the proposed alterations to the Athenæum Club on June 28, 1898, he was not aware that Mr. Barry was architect to the club, or that he had prepared designs for the proposed alterations eleven years previously, or that he was a member of the club.

2. Shortly afterwards Mr. Collcutt was made acquainted with these facts; but he was informed that the design made by Mr. Barry in 1887 had been paid for and abandoned, and that, although Mr. Barry had remained honorary architect to the club, he had not been employed since 1887 or thereabouts in connexion with architectural work done to the club; and, further, that the committee had resolved in any case not to employ any member of the club as architect for the proposed alterations.

3. Although Mr. Collcutt had been employed as architect for the proposed alterations since June, 1898, it was not until April 18, 1899, that Mr. Barry communicated with Mr. Collcutt upon the matter. In a letter of that date he asked Mr. Collcutt whether at the time when the latter had been asked to advise and prepare plans he had been aware that he (Mr. Barry) had been architect to the club since 1881, and still held that office. To this Mr. Collcutt replied by letter that at the time in question he had not been aware of these facts. No further communication took place between Mr. Barry and Mr. Collcutt.

The latter statement, we may observe, exactly agrees with what had been laid before us already; but we admit that the preceding statements throw a different light on Mr. Collcutt's position in the matter. Some architects, we believe, would still have felt that it would be a more courteous and fitting course to have declined to act when informed of the circumstances of Mr. Barry's official position in regard to the club; but we admit that the word "unprofessional," considering the meaning which might be attached to it (we did not use it quite as seriously as Mr. Collcutt supposes), was too strong, and we withdraw it accordingly, and regret having used it.

British Association Presidential Address.

SIR MICHAEL FOSTER, in his Presidential address to the British Association at Dover on the 13th inst., compared the position of science a century ago with that of to-day. He enumerated the beginnings of several well-known sciences, laying especial stress on chemistry and geology. The discovery of oxygen in 1774, and the impetus this gave to several branches of chemical research in later years; the birth of electricity in 1799, when Volta brought to light the apparently simple truths out of which so much has sprung; the influence of Hutton's teaching in the establishment of geology as a separate science; the foundation of what we now know as biology; problems connected with the nervous system which are not to be solved by either chemical or physical means; Charles Darwin's work as suggesting many fruitful branches of investigation in natural science, were amongst the topics selected for special description. Science as a growing inheritance, its connexion with politics, and the international brotherhood of science were also discussed at some length. In reference to the latter, the President stated that the former use of Latin made intercourse amongst scientists easy, but we may add that the almost universal use of French amongst scientists of to-day greatly facilitates the work of the modern investigator. In speaking of the proposed index of scientific literature, the President was rather sanguine; for our own part we are not so sure that it will be as valuable as is generally thought. If the international workers upon it were to implicitly obey instructions as to drawing up their respective portions of the index, and were not allowed to import their own views into them, there might be some hope of the index being of the greatest service. But we have had experience of large indices in the past, and until we are well assured that rapidity of publication and a vigorous editorship or censorship are enforced, we shall refuse to believe in this effort, which has now been sustained for three years. Altogether, the Presidential address was not learned; it was a useful summary of what has been done in a few sciences, and was more suitable, perhaps, for advanced school-boys than for an assemblage of scientists.

The Recent Trades Union Congress.

THE proceedings at the Trades Union Congress which took place last week do not show any improvement in the faculty of looking at questions of labour from a philosophic point of view. We could hardly believe our eyes when we read that the President, in his opening address, re-asserted the old and hopeless fallacy that wages ought to be regulated by an arbitrary scale. "Formerly wages were regulated by custom and by an official tariff, now they were fixed by free competition—that was to say, by the rate existing between the number of hands and the amount of capital seeking employment." Will Mr. Vernon tell us on what basis such a tariff is to be fixed, and who is to fix it? In his remarks on the necessity for automatic couplings on railways, the President either ignored or was quite unaware of the real practical difficulties in the way: viz.: the necessity of having a coupling which can be depended on for efficiency, and which all the companies that interchange traffic can see their way to agree upon. We admit that we should be glad to see the subject taken up with more energy; but it must be considered on common sense and mechanical grounds, and not by sensational phases about "blood-stained traffic." This extravagance of language pervaded the proceedings generally, and Mr. Richard, a Southport delegate, is to be commended for moving to omit from the resolution with reference to juvenile labour the words—"The time has come for Great Britain to cease building its empire on children's hearts, to give up earning its wealth out of children's wasted lives"; his amendment being directed, as he said, not against the principle of the resolution, but against "the use of extravagant language"; a reasonableness of spirit which apparently finds little response among the majority of members of a Trades Union Congress. "Extravagant language" is just what they enjoy.

Commons Preservation Society.

THE "Commons Preservation Society" is now amalgamated with the "National Footpath Preservation Society," the objects of which are of similar nature, and will henceforth be known as the "Commons and Footpaths Preservation Society." The Report of the Executive Committee of the Commons Preservation Society for 1897-98 contains a remarkable list of cases in which they have been successful in resisting encroachments on land which was public property, or over which, at least, there were public rights. In many cases the action taken by the Society has led to a systematic investigation of the history of the land and its ownership, leading to the repeal of claims which had been allowed to arise from want of any protest against them. In the Report of the Footpath Preservation Society for

1898-99 (its last independent report, we presume), 481 cases are mentioned in which the Society took action, brief details of a large number of them being given. The questions of the responsibility for repairing stiles, and liability for injuries from barbed wire, are also dealt with. The Report concludes:—

"The advice and assistance of the Society are still as necessary as ever. Numbers of footpaths are yearly closed for want of enlightened public opinion. Instances are constantly accumulating in the Society's record when effective advice might have secured to posterity rights which, once lost, can only with the greatest difficulty be ever regained."

The Kent and Surrey Committee of the Amalgamated Societies also issues an independent report, from which we learn that more than ninety distinct cases of encroachments upon common land, village greens and roadside waste, and obstruction of rights-of-way have been dealt with during the last year, as against fifty-five of such cases which occupied the attention of the committee in the previous year. Its work, moreover, has not been confined to specific instances of infringement of public rights; for the committee is being constantly appealed to for general advice, which is freely given.

Sheffield Electric Tramways.

THE electric tramway of the Sheffield Corporation, the first section of which, from Tinsley to Nether Edge, commenced regular running two weeks ago, is an excellent example of the overhead system. The overhead wires are generally supported by brackets from centre posts and side posts. For a little way, however, span wires are used. The former is passable, but the latter gives a decidedly "cobwebby" appearance to the sky. The drain rails used in the construction are novel. At certain places drain rails are used instead of ordinary rails, and the roads drain into a slot cast in the groove of these rails, which is connected with the sewers, and allows a free outlet for the water. The combined point and drain rail seems an excellent idea, and the life of the movable tongue ought to be greatly prolonged. The Walkley section of the line, which is now completed and will be shortly opened, has some very steep gradients. This section has special interest for engineers, as many are anxious to see how the cars will work in this country on an incline of 1 in 10. There has been considerable discussion on this point recently. Some engineers think that an incline of 1 in 8 is feasible with smooth rails, and point to examples abroad. Others think that an incline of 1 in 10 is too steep in this moist climate, and point out that difficulties may arise in winter when there is a layer of ice on the rails. The brake arrangements used on the Sheffield cars are specially elaborate and complete. In addition to the hand brake in every car, there is an electric brake, a slipper brake, and a novel trailing wedge brake. The object of the latter is to hold the car fast when it is stopped on an incline. The hand and magnetic brakes are used to regulate the speed, and the slipper brake is of use in descending steep hills. The Corporation has been careful in selecting drivers, and only thoroughly competent and experienced men are employed.

The Dore Rural District.

A REPORT has been made by Dr. W. W. E. Fletcher to the Local Government Board, upon the sanitary circumstances and administration of the Dore Rural District. The district occupies the south-western portion of Herefordshire, and comprises an area of 73,590 acres. In regard to water supply, certain villages have been supplied with water collected in tanks on the hill-sides above the villages, from which the water is conveyed to the houses, or to stand-pipes, by gravitation. Apart from these supplies the inhabitants are dependent upon ill-constructed wells, and upon dipping places situated generally at the bottoms of steep banks. These latter "wells" are said to be fed by springs, but the Report states that there can be little doubt that the water supplied is merely surface water which has undergone a greater or less amount of filtration according to the situations of the different dipping places. The ordinary pump-wells and draw-wells appear to be surface wells, steined, almost invariably, with "dry" rubble stone. There are, throughout the district, many ill-constructed and dilapidated dwellings, some quite unfit for human habitation. The Local Government Board are of opinion that the sanitary supervision of the district, which has been divided among three Medical Officers of Health, has been unsatisfactory, and recommend the appointment of a trained medical practitioner for the whole district, at such a salary as would compensate him for giving up some part of his private practice for this work of sanitary supervision.

Concrete Construction during Frost.

SOME interesting tests with regard to the effects of frost upon concrete work during construction are recorded in the Journal of the Western Society of Engineers, U.S.A. Test blocks of concrete were made with both Portland and with Louisville cement, some of each kind being mixed with salt water. A certain number were allowed to set in a temperature below zero, and others in a warm office, for purposes of comparison. The general deductions obtainable appear to be that freezing before setting does not seem to injure the Portland cement concrete even if, after having frozen hard, the concrete is exposed to alternations of frost and thaw. Green Portland cement concrete exposed to a freezing temperature hardens at a much slower rate, but the ultimate result is in no way prejudiced. The use of salt was found to largely counteract the retarding influence of cold, and to have little, if any, effect on the strength of the concrete. Similar results were obtained from the tests of Louisville cement concrete. Judging from the above experiments, and also from actual reported practice in the construction of retaining walls, anchor blocks, and foundation work, both above and below water level, during the most severe weather in the United States, it becomes clear that accepted opinions as to the influence of frost upon concrete may be considerably modified.

Rust Protection for Ironwork.

AS a protective covering for the iron or steel framework of buildings, the usefulness of cement might be more generally recognised than it is at present. Structural ironwork incorporated within the walls and other parts of a building requires something better than ordinary masonry for the exclusion of moisture, especially in the event of fire. Moreover, air—which in this country always contains relatively large proportions of vapour and of acids—will not be intercepted unless special provision is made for the purpose. Galvanising as applied to ironwork is, of course, out of the question, not only because of its injurious effect, but also on account of cost, and the latter objection attaches to the "Bower-Barff" process. Cement, on the other hand, forms an excellent covering; and in addition to the recommendation of economy, it is naturally inimical to acids. Precautions must, however, always be taken for the removal of mill-scale, rust, and other matter from the surface of the metal, and no interstices should exist in the material, through which moisture may percolate. In France, cement has been employed for years past in the protection of iron railway bridges from the fumes of locomotives, and in Austria a protective wash made with Portland cement and a small proportion of sharp sand has proved satisfactory. When placed below ground level, ironwork ought always to be thoroughly cleansed and laid in properly lined trenches, so that earth may not fall in. Concrete may then be rammed in carefully so that all faults and interstices are avoided. If, as sometimes happens, ironwork must be situated below the line of saturation, the aid of a sand-blast apparatus is strongly to be recommended for cleansing purposes, and strict supervision over workmen is imperative. Additional precautionary measures naturally entail additional expenditure, but this will be amply repaid by increased duration and security.

Department of Science and Art.

THE Forty-sixth Report of the Department of Science and Art contains, as usual, extracts from the Examiners' comments on the work of the Art students. In regard to the Elementary stage of Design it is remarked that while there is less absolutely bad work than before, "there is a great deal of carelessness shown, sometimes so gross as to suggest a kind of perversity which would quite incapacitate any student for practical work." In the Advanced stage of Design it is observed that many seem to have entered who should not have attempted anything more than elementary design, though there is a general improvement. "The suggestion that designs should be adopted to go with some style of architecture has not met with much response." In regard to the "Honours" class in Design, the examiners observe with justice that some acquaintance with poetic and historic literature is necessary to the education of a decorative artist; they also "feel compelled to remark generally on a prevailing deficiency in the understanding of the drawing and construction of the human figure." In Architecture it is observed that the designs include a large amount of good work, but they are remarkably deficient in Renaissance work, and that students whose work is good in other respects fail completely when they touch classic architecture. This implies, what in fact we generally gather from the exhibited designs, that the students who enter for architectural prizes at South Kensington are quite out of touch with the central current of architectural study of the day.

St. Michael Bassishaw.

WE are informed that the highly decorative altar-piece and the two tables of the Decalogue belonging to this church (which is shortly to be demolished) have been secured for St. Michael's, Basingstoke, from which place the family who, it is said, gave their name to the street (if not to the Ward) derived their cognomen. Some, however, assign to the Bassings an Italian origin, as the "Hundred Rolls" of 2nd Edward I. cite them amongst the Lombards; Salomon and Hugh de Basinges were the sheriffs in 1214, and Stow says that in 1246 Henry III. gave and confirmed the advowson to Adam de Basing, who was elected mayor in 1251, and was the son, it seems, of Salomon; a delivery of Infangthef, 13th Richard II., cites the parish of St. Michael Bassieshaw in the Ward of Basyngshawe, and in a "finalis concordia" made at Westminster, in 23rd Charles I., we find the church mentioned as St. Michael Basinghawe. The bell of the church, which was cast in 1679, has been sold, for a nominal sum, to St. Ethelreda's, Fulham, built, in 1896-7, after Mr. A. H. Skipworth's designs.

Changes at Knightsbridge.

TO make room for the enlargement—to include a ball-room—of the French Ambassador's official residence the sites of one or two adjacent shops and of the tavern on the west side of Holy Trinity Church are being cleared. Thus that church will be freed from the reproach that it stands between two public-houses. The church, rebuilt after Brandon and Eyton's joint designs in 1860-1, was originally the chapel of an ancient lazar, or leper house appertaining to Westminster Abbey—the Dean and chapter, we gather, are still the ground landlords. The hospital chapel was adapted and consecrated to its later uses in 1629 by Laud. At Stratheden House, lately demolished, lived and died Lord Campbell, *obiit* 1861, who there wrote his "Lives of the Lord Chancellors of England" and "Lives of the Chief Justices."

Notable Houses at Bath.

THE Corporation of Bath, still busy with their exemplary scheme for recording the historical associations of their city, have lately affixed a tablet upon the house, No. 59, Pulteney-street, wherein Bishop Thirlwall, who died in 1875, passed the last fifteen months of his life. They have similarly distinguished No. 19, Bennett-street, the home during six years of Admiral Phillip, explorer of Australia and first Governor of New South Wales (*obiit* 1814), and No. 19, New King-street, occupied many years by Sir William Herschel, when organist to the Octagon Chapel (built, 1767, in Milsom-street), where he made specula for his own telescopes, and in 1781 discovered the planet which he named Georgium Sidus, since known as Uranus.

Architectural Association Discussion Section.

THE Discussion Section of the Architectural Association, which began in a tentative manner and on a small scale, seems to be developing almost to the importance of a new series of sessional meetings. The following is the list of subjects and dates for the coming Session :—

	Subject.	Author.
October 13	Debate: The Registration of Architects	A. R. Jemmett and G. A. T. Middleton.
November 3	Brasses	G. H. Smith.
„ 17	Tenement Houses for the Working Classes	Robert Williams.
December 1	Church Furniture	F. C. Eden.
1900.		
January 5	The Public Monuments of London, Architecturally Considered.	V. H. King.
„ 19	Granite as a Building Material in the Channel Islands	C. B. Bone.
February 2	Opening Up Land for Building Purposes	G. M. Nicholson.
„ 16	Some Aspects of Modern Architecture	W. A. Forsyth.
March 2	Debate: The Question of the Model By-Laws	J. Humphrey Jones, B.A. J. H. Tyars. F. T. W. Goldsmith.
„ 16	The Church of St. Francis, Assisi: A study in Colour Decoration.	W. E. Dobson.
„ 30	Ventilation and Warming	T. W. Aldwinckle, jun.
May 18	Some Essentials to Health	H. C. Lander.
„ 25	The Legal Position of the Architect	L. L. Macassey. (Barrister at Law).

This is certainly a remarkable series of subjects, the discussion of which ought to be both beneficial and interesting to those taking part in it.

STEAM ENGINES AND BOILERS FOR SAWMILLS.

BY J. L. CRATHORNE.

NOTWITHSTANDING the great strides which have of late years been made in engine and boiler design and construction, it is by no means a rare occurrence to find factories in which the motive power is at once unsuited to the duty it has to perform and the reverse of economical. It may, therefore, be of use to those who purpose renewing their plant or fitting up new sawmills to describe briefly the most suitable types of engines and boilers for these purposes.

Engines.

First as regards the engine. For sawmill work, where the duty is very severe from suddenly applied loads, &c., the engine should be of massive design. The writer is of opinion that a long stroke, say, twice the diameter of the cylinder, with a moderate piston speed of 450 ft. to 550 ft. per minute, is to be much preferred to the high-speed short-stroke engines sometimes pressed into the service. For cheapness' sake it is the practice of some engine-makers to employ a short bed-plate only extending to the front end of the cylinder, the cross-head guides being of circular form and bored at the same time as the cylinder. This plan answers well in small engines, but for those of larger powers an extended box bed plate is to be preferred, with double motion bars, it being easier to take up wear when the slide blocks become worn than in the circular pattern.

Corliss engines with girder frames are not much used in sawmills, on account of their great first cost and their intricate system of valves. For small powers the horizontal high-pressure engine is suitable for sawmill work, and, when fitted with automatic expansion gear, a very fair degree of economy is obtainable. By employing the automatic cut-off or expansion form of governing, the full pressure of steam is available for use in the cylinder instead of being "wire-drawn" by the ordinary governor and throttle valve. Also, the steam consumed in the engine is proportional to the load which it is at any time working against. Thus, if half the machines in the mill are idle, the engine, having a greatly reduced load, cuts off the steam earlier in the stroke, and consequently uses less.

Compound engines can be recommended for the larger powers, being more economical than the ordinary high-pressure engines. The side-by-side pattern is to be preferred to the tandem, being steadier in running and easier to start; also the steam passages between the cylinders are much shorter, consequently condensation of steam is reduced. On the other hand, compound engines are of more complicated construction, involve greater first cost, and require a high steam pressure to be economical. In some cases where the fuel is cheap and skilled labour is scarce, or where existing boilers working at low pressure are to be employed, it may pay to put down a simple form of engine instead.

If water is plentiful, a further degree of economy may be obtained by the use of a condenser.

Whatever type of engine is chosen, it should be provided with an extra heavy fly-wheel to enable it to cope with sudden additions of load obtaining in sawmills.

As regards details of construction, all bearing or working surfaces, such as crank and cross-head pins, crank shaft journals, slide bars, &c., should be of ample area to prevent excessive wear, and all bearings should be readily adjustable. Bearings of phosphor-bronze can be recommended in preference to gunmetal. The crank shaft should be of steel or the best fagotted scrap iron, and crank-pin and cross-head pin also of steel. The cylinder, or cylinders, should have a sufficient thickness to allow of reboring two or three times, and should be lagged and covered with a good non-conducting material, such as slag wool, hair felt, or asbestos. Efficient means of lubrication should be provided. A sight feed lubricator can be recommended for the cylinder instead of the old-fashioned grease cups, as by its use the cylinder can be kept constantly lubricated, the attendant can easily regulate the supply of oil and see at a glance when the container requires replenishing.

For keeping the crank-pin supplied with oil a lubricator is now made in which the oil-container is stationary, and the oil led to the bearing by centrifugal force through a pipe revolving with the crank. This arrangement is very convenient, as the oil may be replenished while the engine is running.

The engine should be of ample power for the work it has to perform, as forcing a small engine is the reverse of economical.

A guarantee of the brake horse-power which the engine will give out at a given steam pressure and speed should be obtained from the makers, as the cylinder sizes for given nominal horse-powers vary considerably.

Boilers.

When deciding what type of steam generator to employ, two things have to be primarily considered—

1. The purity or otherwise of the feed water.
2. The quality of the fuel.

1. If the feed water contain much lime or other foreign matter, either a boiler of simple construction, such as the Cornish or Lancashire, must be employed, or the feed water must be purified before it enters, in which case a tubular boiler, such as the locomotive or water-tube, may be used. In the case of compound engines the latter course would probably be the wiser to adopt, as these engines, to be economical, require a higher steam pressure than is usually provided for in the Cornish or Lancashire types. A feed water heater can be recommended, whether the water is pure or not, as a hot feed prevents much straining of the boiler plates, which occurs when quantities of cold water are pumped in.

2. If the fuel is of good quality it will burn well in any boiler; but if inferior, then a type must be chosen which will consume it to the best advantage. The Cornish and Lancashire boilers will burn fuel of a much worse quality than can be consumed in the locomotive type, and usually with less smoke. The fuel generally used in a sawmill is a mixture of coal and wood refuse. This requires a large grate area to properly consume it, and in the case of a locomotive boiler a fire-box, about one-third larger than is usual, should be provided.

The advantages of the locomotive boiler may be taken as :—

1. Rapid raising of steam.
2. Comparatively small cost of fixing.
3. Small space occupied.

4. Capable of working at high pressures with safety.

And of the Cornish or Lancashire types:—

1. Simple construction, admitting of easy inspection, cleaning, and repairs.

2. Will consume inferior fuel without producing much smoke.

3. An even pressure of steam is easily kept up with suddenly varying loads on account of their large steam space.

On the other hand, the cost of fixing a Lancashire boiler is very great, and considerable space is taken up by the flues and settings. Also, this type is not so well adapted for high pressures of steam as the locomotive or water-tube, although a special form of Lancashire is now made to work at pressures up to 200 lbs. to the square inch.

Cone cross tubes can be recommended in the flues of Lancashire boilers, as they improve the circulation of the water and strengthen the flues against collapse. A new form of Lancashire boiler has lately been introduced in which the usual double flues with cross tubes are used combined with a series of horizontal tubes usually placed above them. It is claimed for this arrangement that the heating surface is increased, that the circulation is improved, and that the quantity of brickwork required for setting is reduced. Where the feed water is fairly pure these boilers should prove useful.

When a compound engine is employed—which to give good results economically requires a high steam pressure—a tubular boiler, such as the locomotive or water-tube, will probably give the most satisfaction provided that the feed water is fairly pure or a purifier is employed. Water-tube boilers have been considerably introduced of late, and it is claimed for them that they are economical, that the heating surface is great, that a very small space is occupied and that, should an explosion occur, it is usually only a tube that gives way.

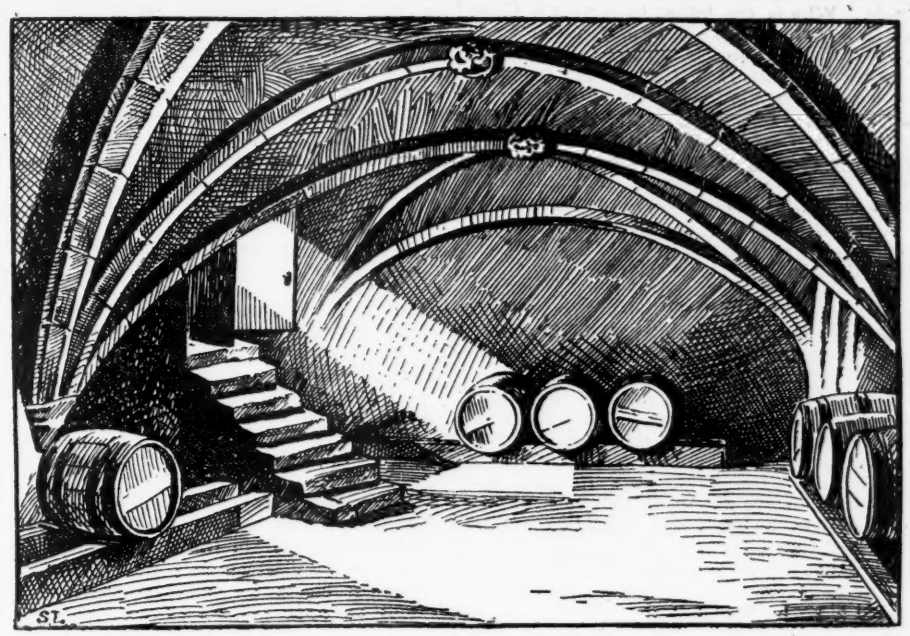
Vertical boilers are useful for very small powers and confined spaces, but cannot be recommended above 8 or 10 horse-power.

Whatever type of boiler is chosen, it is of great importance in its economical working that the chimney stack should be of such a height and area that the right amount of air is drawn through the furnace to consume properly the fuel and produce as little smoke as possible. The outside flues of a Cornish or Lancashire boiler also require careful calculation so as to permit a ready flow of the hot gases round the boiler, and yet at the same time not liberate them until all useful heat has been extracted. The chimney-stack must be placed near the boiler and connected with it by a flue devoid of bends and elbows. On no account should the boiler be set upon a midfeather, which would prevent proper inspection and conceal any corrosion that might exist. The area of the fireclay setting in contact with the boiler should be small. The boiler must be of greater power than the engine—say one-quarter more—and must be fixed as close to it as possible, to reduce condensation. The engine should be placed at a slightly higher level than the boiler, so that any water in the steampipe would gravitate to the stop-valve, where a cock should be provided for releasing it. If the distance be above 20 ft., a steam trap or separator must be fitted. In any case, a good non-conducting covering for the steam-pipe is necessary. A similar covering, such as slag-wool or fossil-meal, should be provided for the boiler, and put on in sections so as to be easily removable for inspection. For feeding the boiler two pumps, or a pump and an injector, can be recommended, and in the first case one of the pumps should be independent of the main engine in case of the latter breaking down. The mountings should include two safety valves, two water gauges, steam pressure gauge, test cocks, and blow-off cock. One of the safety valves should be capable of being set to a certain pressure and then locked up so that it cannot be tampered with by the boiler-attendant, who might be tempted to overload or wedge down the valve when pressed for steam The dead weight safety valve has much to recommend it, as there is an entire absence of springs or levers, and the valve can be obtained in neat lock-up form. The water gauges may with advantage be fitted with protectors to prevent injury to the attendant should the glass break, a very common event in frosty weather. A patent water gauge is now made containing two ball valves, which, if the glass is fractured, are forced on to their seats by the pressure in the boiler, and thus prevent the escape of water and steam. Test or pet cocks with external asbestos packing can be recommended, as they can be more easily kept from leaking than those in which the plug passes through the cock.

In conclusion, a few remarks regarding the care of boilers may be of use. They should be frequently cleaned out and examined, say once a month, if the feed water is good, or more often if it is not. Frequent blowing off of a portion of the water during working hours tends to keep the plates free from scale, but whatever precautions are taken this is sure to accumulate, and must therefore be removed periodically.

With the object of preventing incrustations or scale in boilers, numerous fluids and compositions are from time to time placed on the market, each claiming to be a positive cure for all waters containing impurities. These statements are, of course, absurd, as the different substances contained in different waters cannot all be precipitated by one remedy. There are two courses open in the case of impure feed water: one to have the water purified before it enters the boiler—which should always be done if very bad water has to be used in a locomotive or other tubular boiler—the other to have the water analysed and a remedy, for use in the boiler, prescribed by an expert, which may be expected to prevent scaling in some degree, though it is impossible to do so entirely by this means. When an analysis of the water cannot be obtained, a small quantity of tannate of soda put into the boiler, say, once a fortnight, will often prove beneficial, and in any case will do no harm.

As some of the fluids and compositions sold are actually deleterious to the plates, great caution should be used when adopting them, and if possible the opinion of an expert obtained before doing so.



The "Undercroft," Southampton.

THE UNDERCROFT, SOUTHAMPTON.

THIS is a sketch of the ancient vaulted cellar in Southampton, the preservation of which was the subject (as mentioned in our last) of a special memorial of the Sanitary Institute Congress to the authorities of Southampton.

PROPERTIES FOR SALE.—The Oxford Military College, at Temple Cowley, near Oxford; the buildings, occupying about 3½ acres, were designed by Mr. T. G. Jackson, R.A., for 120 students and staff, the old manor house being retained as the master's residence.——A large portion, embracing an area of 18,200 square feet, of Reid's (formerly Meux's) Brewery in Clerkenwell-road (formerly Liquorpond-street) and Leather-lane, together with a block of model dwellings in Portpool-lane, another block adjacent known as Griffin Buildings, the Brewery House in Hatton-garden, and a large number of houses and shops in the immediate vicinity of the brewery premises, which are no longer required for that purpose, owing to the recent formation of the amalgamated company—Messrs. Watney, Combe, Reid, & Co.

Books.

Durham: the Cathedral and See. By J. E. BYGATE. London: George Bell & Sons. 1899.

THERE are a number of books on Durham Cathedral, small and large, old and new; in fact, no cathedral in England seems to have received more attention from writers than Durham. All these books lie before us as we write, and it is only telling the plain truth to say that this, the last of the line, is the worst of them.

Taking the illustrations first, we find twenty-six reproductions of photographs. Fourteen of these are—some good and some fairly so. The other twelve are either bad as photographs or badly reproduced. As photographs they are distinctly inferior to most of those in the last edition of Canon Greenwell's excellent guide, but some are better printed. Several of the interiors are taken the wrong way of the plate.

Looking over the line drawings and engravings we see the same total want of judgment. Why was the crude and inaccurate engraving from the first edition of the *Monasticon* reproduced on p. 17? If it were desired to show a view of the removed western spires, better material was just as available. There are three borrowed blocks, one each from "Boutell's Christian Monuments," the "Glossary of Architecture," and the South Kensington Museum "Art Handbook on Ironwork." This last (opposite p. 26), it is the only passable drawing published in the book. The sketches of the knocker, p. 26, and of the Galilee capitals, p. 66, should be compared with Billings's sketches of the same things, one on his title page, the other on plate 35 of his monograph. What could be done well in 1842 can be done better in 1899. At the end is a double-page plan which seems to have been copied from the plan issued with the *Builder*, June 3, 1893. Not only is the lettering the same throughout but the drawing of certain things which appear on no other plan is so absolutely identical that there is strong suspicion of an intentional copy having been made, the vaulting lines and some other details being omitted.

Passing to the letterpress, we find frequent evidence of carelessness or ignorance. The frater is in the south side of the cloister, and not on the west, as stated on p. 14; and why is it here called "refectory" and "frater house" on the plan? The Norman chapter-house has not "lately been entirely rebuilt," as a great part of it remained when the completion was begun. A wrong date is given for the removal of the leaden spires on the western towers; it was during the Civil War, and certainly before 1662, when Cosin asked where they had gone to, and not 1697, as stated on p. 21. This case is correctly stated both in Greenwell's and Boyle's Guides, which the writer says he has used. The foundations of Carileph's apses were found in January, 1895, and not December, 1896, as stated. Wrong dates are so numerous

as to throw doubt on the accuracy of the whole. Why is the battle of Neville's Cross said to have been in 1348 on p. 49, and 1346 on p. 179? Hugh Pudsey is said, on p. 84, to have held the See from 1153 to 1195; but on p. 104 these dates become 1154 to 1197. He actually reigned from December 20, 1153 to March 3, 1195. There are no less than twenty-three wrong dates given in the list of the bishops, and this after the publication of their pontifical years entire in the *Transactions* of the Durham and Northumberland Archæological Society, IV., p. 19. This series the writer implies in his preface that he has consulted.

From wrong dates we turn to wrong technical terms. In these the writer is clearly at sea. What, we ask, are "pyramidal jambs" to windows (p. 104)? There are no "Tudor flowers" properly so-called in the lantern arcade. Twice over (pp. 105-115) scalloped capitals are called "cushion" capitals; an unsuitable expression once common, but long since abandoned. There are no "pilasters" in the western tower arcades (p. 21), and "brackets" is not an explanation of squinches (p. 22), nor is the ceiling of the cloister "coffered" (p. 30).

The literary arrangement of the book is wanting. A complete stranger to Durham should have been told at the outset about the "Rites of Durham." There are several long quotations from this work, but p. 34 is reached before it is mentioned by name, and there is then no explanation given of what is meant by "Rites of Durham."

We have criticised this volume of the series in detail, as we think it is only due to the public that guides to cathedrals issued by well-known publishers should be creditably handled, both from a literary and pictorial point of view, as in fact most of the others of this series have been. In the case of Durham there was no excuse for laxity on either count. Any writer had only to make a decent compilation from Greenwell's and Boyle's guides, to go no further. These books are not only scholarly productions, but minutely accurate also. As to the illustrations, quite half of them had far better have been omitted altogether, unless the intention was to fill space cheaply. Some of the full-page plates are mere blotches, notably that opposite p. 112, which gives no idea to a stranger of the fine outline of the city as seen from near the railway station.

The Student's Guide to the Practice of Measuring and Valuing Artificers' Works. Originally edited by EDWARD DOBSON, architect, with additions by E. WYNDHAM TARN, M.A., architect. Seventh edition, revised. London: Crosby Lockwood & Son, 7, Stationers' Hall-court. 1899.

THIS work is a most disappointing one. The title-page is comprehensive enough, and the authors can claim that examples of all the subjects mentioned therein are contained in the book, which, however, bears the too obvious evidence that it "is based upon one published many years since," *vide* preface. There is at the present time, too great a tendency to republish works that have served a useful purpose in their time, with very little attempt to adapt them to modern requirements. In the work now before us, we are informed that this is the "seventh edition, revised"; but, notwithstanding this statement, we must, upon examination, come to the conclusion that the revision is not so complete as it might have been; in fact, the more one examines the work, the more one feels that something little less than rewriting is what is necessary, using, as a basis, the combined efforts of the original author (who is not named) and the two gentlemen whose names appear on the title-page. There is certainly much that is useful in the book, and a good deal that is at present worse than useless, which could, with a little care, be made of value to the student referred to in the title.

As an instance of the out-of-date character of the work, we would refer to the note as to bell-traps on p. 217. We were under the impression that these were quite obsolete in all well-regulated sanitary works. Again, the paragraph referring to cast-iron beams, on p. 180, might have been applicable to works executed at the time the book was first written, but we doubt if cast-iron beams would be used at the present time under any circumstances. One would have thought, moreover, that, considering the now almost universal adoption of steel in lieu of wrought iron, that material would have warranted something more than the very short paragraph on p. 326c, Appendix III.

To come to the portions referring more particularly to the main subject of the work. The rule for measuring the lengths of hips given on page 84 is a marvel of complexity for a very simple problem; we should like to know also to what the author refers on page 101, when he says, "hips and valleys to be taken at per foot run, for cutting and waste;" is this in the timbering, or, if not, in what? One would have thought that the day was passed for bond timbering to be considered at all; but a rather elaborate description is given of the mode of measuring. The first two items of "Floors," on page 102, are somewhat puzzling, whilst the third item, "Girders sawn down and reversed," is almost, if not quite, out of date.

We do not think that many builders would appreciate the system of measuring joiners' mouldings, given on page 120; and the examples of measuring joiners' work, given on pages 121-126, are startling, apart from the various glaring typographical errors. We pity the poor student who would endeavour to gain knowledge from these examples. What is "whole deal," given on pages 121 and 126? The instructions for measuring sashes and frames on page 123 are extraordinary; how would these work if the surveyor had, as is frequently the case, $\frac{1}{8}$-in. scale drawings to work from? We should have thought the ordinary method of calculating from a rigid dimension, such as the external size of the opening, would have been just as simple. We never before saw staircases described in bills of quantities, as "common" and "second best;" and then "allowing extra for the width of the skirting," seems rather a strange instruction. We presume the author refers to the housings into the strings, but these are not referred to at all. We wonder, also, how the average surveyor would be served if he used the marvellous arrangement of abbreviations given on pages 118, 119, with the others in the various items for which there is no key, and which we have endeavoured in vain to interpret. Dimensions written in the way followed in these examples would be a source of innumerable errors, for which no one would be to blame but the "taker off" himself.

As an example of what a bill of quantities ought *not* to be, that given on pages 313-325 affords a good illustration; taking it from every point of view, we fail to see upon what basis the order is arranged. The most flagrant examples of this jumble occur in the joiner's bill, where labours and material, deal and hard woods, are all mixed together, regardless of sizes, descriptions, or anything else. Certainly, the author displays a commendable modesty as to the rates for surveyors' fees, *vide* page 312; but even these are too high for work prepared on a system based upon the examples in this book.

We have dealt rather fully upon the faults in this work, but we think that a protest should be raised against the re-dishing of obsolete works such as this, with little or no attempt to bring them up to date. It is somewhat difficult to say who, out of the three gentlemen concerned, is responsible for some of the faults; some being those of age, whilst others appear to be partly this, and partly a want of acquaintance with the subject—at least the modern treatment—and others still, a great lack of care in arrangement, and in the revision of the work, as displayed in the examples of "taking off" and "billing."

The decision that one is bound to come to, after thoroughly studying the work, is, that without practically rewriting, it is worse than useless for the purpose for which it is designed; as the student would have great difficulty in selecting those portions which he could follow with the result of obtaining any reliable information.

Land and Engineering Surveying. By T. BAKER. Seventeenth edition. Revised and extended by F. E. DIXON, of Preston. Weale's Scientific and Technical Series. London: Crosby Lockwood & Sons.

So many rudimentary treatises upon the subject of land surveying for engineering purposes have been published in recent years that there appears to be no good reason for another volume; but the present illustrated work, being the revised edition of a book which at the date of its original issue supplied a much-needed demand, deserves to be perpetuated, and we therefore welcome the seventeenth edition now before us, revised by Mr. Dixon. The chapter upon levelling is stated to have been rewritten, and describes the most approved way of keeping a level book, except that it is more in accordance with daily practice to check the reductions upon each page by itself, rather than to carry forward the summations as shown upon page 122, making the last staff reading upon each page a foresight for convenience of checking and reducing the levels as stated on pages 118 and 124. Under the head of Precautions in Levelling, it is said that the staff-holder must always hold the staff in a vertical position, but there is no allusion to the necessary waving of a staff in order to secure the perpendicular height, as described in the *Builder* of May 7, 1887, page 686; and it is difficult to see why the reviser has inverted the figures without inverting the staff, so as to make the readings appear as they would be seen through the telescope of a dumpy level, for, as illustrated on page 107, a student would be puzzled in reading the hundreds above or under half a tenth.

Revised editions have been issued by Professor Young, but Mr. Dixon has added a short chapter dealing with the publications of Ordnance maps. On page 183 he describes plotting a survey made with the magnetic needle by the aid of a protractor. We should like to have seen an example of plotting by northings and southings, east and west by the aid of sines and cosines. Otherwise the reviser's notes on practical work are good, but in his tables for reference he has attempted too much. In his hydraulic memoranda on page 15, he gives no unit for his area of channel, and the approximate expressions furnished by him both for the velocity and the discharge in gallons per minute need revision, and might very well have been omitted from this little volume.

Practical Masonry. By WM. R. PURCHACE. London: Crosby Lockwood & Co.

MR. PURCHACE is able to tell us, in this the second edition of his book, that no adverse criticisms have as yet come to his knowledge. At the expense of adding to the monotony of gratifying receptions, we will say that we think the book excellent, on the whole, for the purposes for which it is intended. It is direct in its explanations, and the diagrams are clear. Its purpose is to assist the mason in the setting out of his work.

Yet, if we may make a reservation or two, we should say, in the first place, that the author has "written down" to the average intelligence and enterprise of the class which he proposes to instruct. If there are difficulties to be overcome he shows an inclination to avoid them. For instance, where an ellipse is demanded in the diagonal rib of a groined vault, the situation is met by the use of compasses, and a consequently crippled curve. Every architect when drawing a freehand moulding knows that the joiner or mason will try and strike it unless he be circumvented, and one can feel no gratification when the most ready means of accomplishing this trick is demonstrated. In examples of old groining the sweep of the diagonal rib was both eased at the point of clearance and by slightly increasing its depth towards the springing. But when it is laid down that all ribs shall clear at the same height, and their depths be invariable, you have, while making it a plain sailing job for the mason, handicapped the problem at the start. Let the easement come where it will, a crippled outline is by far the more objectionable. The author explains that his method also avoids the plough-share twist in the cell filling; but this to our mind is not otherwise than attractive, and we are inclined to regard his objection rather as another difficulty avoided.

In this second edition, some extra plates showing Greek and Roman mouldings have "by request" been added. These mouldings are drawn to so small a scale and printed with so uncertain a line that any display of the delicacy which belongs to Greek mouldings is impossible. Neither can such mouldings be judged from a few examples only, since they differ as their function and position differ. Moreover, the examples given are not absolutely correct. The piquant *beak* mould of the Parthenon cornice has been represented as a straight drip mould. If these plates have been added as a matter of general interest it is one thing, but when put into the hands of

practical masons for working purposes, they are valueless and dangerous also.

The glossary, which, while it surely goes out of its way to define a staircase as something "which enables persons to ascend or descend from one floor to another," does not describe the hyperbola, although it has done so in the case of the parabola and ellipse. This part will no doubt be revised in the next edition.

The Principles and Practice of Timber Measuring and Valuing. By TOM BRIGHT, Fellow of the Auctioneers' Institute, &c. London: "Land Agents' Record," Limited, 149, Strand.

ALTHOUGH this book is intended chiefly for land-agents and land-valuers, it is not by any means without interest to the architect and builder. The four methods of measuring round timber are described, namely, the "true-content," "die-square," "calliper," and "quarter-girth" methods, and the author declares himself in favour of the last, much-abused though it has been; the calculations on page 8 are correct in result, but wrongly expressed. The chapters on "The Identification of Trees" and on "The Conversion of Timber: Its Characteristics, Uses, and Values," are among the best in the book, and contain many useful hints on the identification of different kinds of tree and wood, as well as some interesting advice to the young valuer when in doubt. In the remainder of the book consideration is given to the haulage and carriage of timber, defects in trees and their influence on the value, the growth of trees, &c. Mr. Bright writes clearly and concisely, but it is a pity that the proof-reader did not strike out the superfluous "and" which erroneously occurs before the relative pronoun "which" not less than seventeen times. The book, however, in spite of such small defects, is a decidedly useful one.

Pumps: Their Principles and Construction. By J. WRIGHT CLARKE. B. T. Batsford, London. 1898.

ALTHOUGH possessing a somewhat comprehensive title, this little volume is practically an elementary treatise on pumps for hand-power, with passing references to other means available for driving, and it concludes with brief descriptions of chain-pumps, bucket-chains, and bucket-wheels.

So far as primary forms of pumps, suitable for industrial and domestic purposes, are concerned, the descriptive matter leaves little to be desired. Practical details are well considered and illustrated, whilst such explanations of natural laws as are necessary are interspersed. No previous knowledge is assumed on the part of the reader, and the book is, therefore, the more likely to be of service to mechanics, students, and others who may wish to obtain reliable information on the subject up to a certain point.

The Wolverhampton Sewage Works. By ERNEST BERRINGTON, M.San.I., F.I.S.E., &c. London: Hodgetts, Limited. 1899.

THIS pamphlet is an illustrated account of the sewage purification works at Wolverhampton, and is interesting chiefly by reason of the peculiar nature of the sewage itself. As every one knows, the staple industry of Wolverhampton is the galvanising of iron, and until a few years ago the waste products of the processes involved were discharged directly into the sewers, with the result that the sewage farm was an utter failure. Manufacturers are, however, now compelled to treat the waste products before passing them into the sewers, and it has become possible to deal satisfactorily with the sewage. There is nothing particularly novel in the system; milk of lime is used as a precipitant in quantities varying from seven to twenty grains per gallon, and the sludge is allowed to settle in tanks which can be worked on the continuous or quiescent system, the former giving the better results. The sludge is pressed into cakes in the usual way, and the tank effluent is passed over land, of which 450 acres are available for irrigation. The "Garfield" filter, named after the inventor, who is the manager of the works at Wolverhampton, is described, coal being the filtering medium; but it is somewhat strange that no mention is made of Lowcock's filter, which was tried at Wolverhampton a few years ago, and which appeared to effect a great amount of purification.

A Course of Instruction in Wood-Carving according to the Japanese Method. By CHARLES HOLME, Editor of the *Studio*. London: Offices of the *Studio*.

WE may be classed by Mr. Holme among the dullest of pupils, but we are sure we could not learn to reproduce the diagrams with which his book is furnished, and which are set forth as progressive lessons, with any Japanese spirit. Simple geometrical patterns cut with a corner tool we might be able to effect, but when it came to the "wave" or "water" form, or "a brush of long white hair frequently carried by the Buddhist priests," any success attending the endeavour would be due to our own genius, if we may be pardoned the boast, rather than to any assistance he has afforded. The illustrations are woodcuts and are only 2 in. square. We are ourselves admirers of the woodcutter's art, and would see it again occupy a more prominent position. But it is in diagrams that a process-block is most admissible, and, so reproduced, the examples in question would have been far more intelligible to us. The author, upon a visit to the University College in Tokio, was much struck by a series of practical object-lessons prepared by the master of the School of Wood-carving for the use of his pupils, and these are the originals of the illustration. The carving of the East, whether Chinese, Japanese, or Indian, is exceedingly rich and the result of much patience. But it is also executed in a style above all things traditional, and indigenous to the countries in which it is practised. By imitating such work it is possible that an English student may acquire thoroughness, but since his natural instincts can have nothing in common with the design, the result is not likely to be convincing. We are aware that both Japanese painting and carving are much admired by certain connoisseurs and when judged from a particular standpoint we admit that they are admirable. But we claim the painting of English masters to be much more admirable, and our own carving, executed in the fifteenth and seventeenth centuries, to be much more effective, and had Mr. Holme's book been a more practical presentation of Japanese wood-carving than it is, we do not think it would have proved a material addition to our methods of instruction. That there is much room for improvement in this particular is a fact to be lamented. Many of the "copies" in use in our so-called technical schools are quite the worst for the purpose. We are inclined to think that motives of economy here play a part, and that instead of a pupil being set to boldly block out a boss which would run into material, he is instructed to niggle away at a small renaissance panel. Let us say, however, that we strongly advocate simplicity in the forms of tools. Those used by the Japanese carvers are described in the book, and appear to be only three in number, and, moreover, they are all straight in the stem, their variety being marked by the finish of their points. An examination of mediæval carving will lead to the conclusion that only straight tools were employed. Yet the modern carver, with a commercial eye on speed in execution, has furnished himself with an array of instruments that might put the dentist's table to shame. Chisels, gouges, grounders, corner, and V-tools are the parent stock, but the adaptations of these which the individual may hammer out to suit his particular taste are endless. Among these the grounder family is the special offender, being abruptly bent in the shank, and capable of executing restless flashes of surface which are purely meretricious. The modern tool has converted itself into a mould, which always turns out the same effect, giving the least opportunity to play of hand, and we earnestly support Mr. Holme towards a reformation in this direction.

Chinese Porcelain. By W. G. GULLAND, with notes by J. LARKIN, and four hundred and eighty-five illustrations. London: Chapman & Hall, Limited. 1898.

MR. GULLAND has put together a book which should be of service to collectors. We speak with some diffidence, since we are not collectors of this ware ourselves. We have the doubtful taste to greatly prefer the imitations in Delft, Chelsea, and Worcester, since these are procurable in the *pâte tendre*—soft paste. *Pâte dure*—hard paste, is very transparent, but glass is more so, and the fusion which this clay, or rather decomposed rock, undergoes, removes it from that large and congenial company of terra-cottas, to which belong the wares of Greece and Rome, the majolicas of Italy, delft of Holland, Chantilly of France, and the many beautiful things from our own potteries. It is agreed that you cannot place a piece of Chinese porcelain by the side of any other faïence. If you collect it, you must collect nothing else, and if you write about it, you must refer to nothing else, and Mr. Gulland has most strictly kept to this rule.

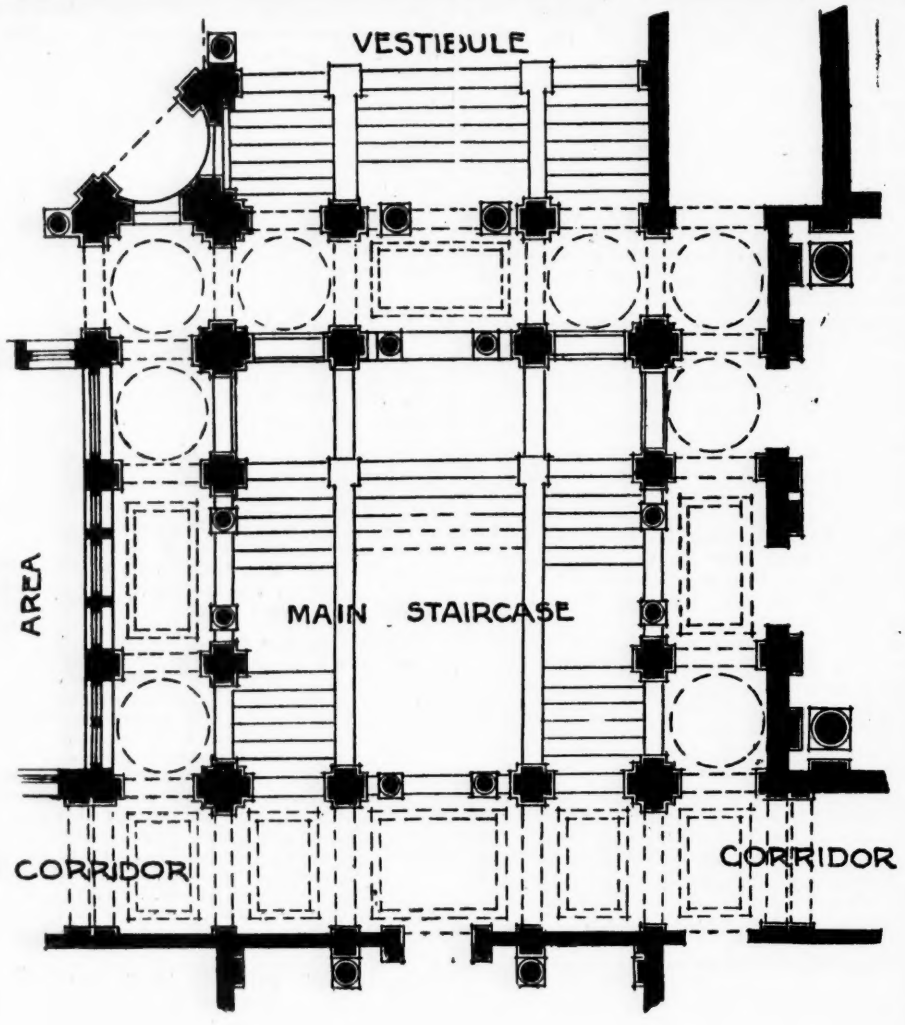
Chinese porcelain never forgets that it was made in an Imperial factory. Its dates are expressed in terms of dynasties, those of Ming and Tsing being of first importance. If we may venture to put these into figures, the Ming counts from 1386 to 1644, and the Tsing from 1644 to the present time. There is a striking similarity both as to the measure of time and method of production, between Chinese porcelain and the kings, cats, and scarabs, of Egypt. These were wrought during dynastic periods by Imperial slaves, but that was more than three thousand years ago. We are, may we say, greatly indebted to the author for having given us the true name and legend of the celebrated "Willow Pattern" plate, which is really the "Blue and White Mandarin," while its elucidation and story is as follows:—

"To the right is a Mandarin's country seat. In the foreground is a pavilion, in the background an orange tree in full bearing. The estate is enclosed in a fence. At one end of the bridge is the famous willow tree, and at the other a gardener's cottage. At the top of the plate, left hand side, is an island with a cottage on it. The birds are doves. The three figures are the Mandarin's daughter with a distaff in her hand, the lover, and the Mandarin. The story is this. The Mandarin had an only daughter, Li-chi, who fell in love with Chang, her father's secretary; and he lived in the island cottage at the top of the plate. The Mandarin forbade the match, and the lovers eloped. . . . . The father pursued them with a whip, and would have beaten them to death had not the gods turned them into turtle-doves."

The whip in particular has been misinterpreted. The mandarin was thought to be fishing. The so-called "Hawthorn Pattern" is in reality the prune tree, an emblem of longevity. Whatever the pattern, indeed, whether fruits, flowers, or mandarins, it would appear to have either a symbolic or mythological significance, and since Mr. Gulland explains all these for us, it really makes Chinese porcelain quite intelligible. Even the dragon of the air, of the mountain, of the sea were of the most serious import to the designer. The first portion of the book deals very fully with the symbolism of form and the mythology of Buddha. From this we are carefully taken through the various kinds of porcelain, commencing with the class known as céladon, or self-coloured pieces, most familiar to us in the form of a carafe, and of a colour once known as "peacock blue." Both paste and colour are baked in one firing. The blue and white varieties are also completed in one firing. In another make, the colour is applied to the biscuit (or baked paste) and the glaze added. But by far the most numerous and elaborate specimens are painted over the glaze, the colours being fixed by firing at a lower temperature. But such information as this, although important as distinctions for classification, cannot be dwelt on apart from the examples which are given in great variety in the form of photographs. Moreover, these processes are common to the production of all pottery, and can therefore be of no special interest to the collector of Chinese porcelain.

The Story of Nuremberg. By CECIL HEADLAM, with Illustrations by Miss H. M. James. London: J. M. Dent & Co.

"THE Story of Nuremberg" is the story of the Emperor Maximilian. He was to Nuremberg what Lorenzo the Magnificent was to Florence, the brilliant courtier, the patron of the merchant, and the friend of the artist. Feudalism has left its traces in her towers and churches, but the castle is forgotten in the presence of the later city, while interest in ecclesiastical Nuremberg is identified with the Reformation. Modern improvements have unfortunately already commenced to undermine her reputation as the first of Mediæval cities, and Rothenberg may fairly dispute her claim. But imagination can still picture the home of Albert Durer and Hans Sachs. As one may trace a resemblance between Maximilian and Lorenzo, so one sees much in



Staircase, New Guildhall, Cambridge. Plan.

the strenuous and unrequited toils of the German artist to remind him of the immortal Angelo. "I can truthfully say," wrote Durer to the Council, "that in the thirty years I have stayed at home, I have not received from people in this town, work worth 500 gulden—truly an absurd and trifling sum—and not a fifth part of that has been profit."

Michelangelo had occasion to complain in much the same manner. "My whole youth and manhood," he wrote, "have been lost, tied down to this tomb [Pope Julian's]. I see multitudes with incomes of 2,000 or 3,000 crowns, lying in bed, while I, with all my immense labour, toil to grow poor." If alike in their greatness and their struggle, their temperaments offered contrasts enough, the southerner lonely, vehement, and unbending to the end; the northern artist, gentle, and filled with the peace that his work, his family, and the hum of the city brought to him.

The style of the book is discursive, and historical incidents are submerged in the telling of them, a counterblast, perhaps, to the precision of Baedeker and Murray. This may afford some advantages from the point of view of *the story*, but if the book is intended, as we take it it is, to serve as a guide also, the plan is not adopted for reference. It would possibly have been expecting too much from Mr. Headlam had he forborne all reference to the "Nuremberg Maiden," and other Mediæval inventions for arriving at the truth. The torture chamber possesses a curious fascination for certain people, and the author has provided for these more than an ample feast. But since he speaks of the "aching picturesqueness" of a red-tiled roof, we can conceive that his feelings have ceased to be responsive to actual horrors. A passing reference only to these matters would have compensated the tourist, inasmuch as he would have had some dozen pages less to carry about.

The book is a neat one, and conveniently bound, while the drawings which Miss H. M. James has provided are pretty and in harmony with the general finish, for which element in book production the publishers have earned a very proper reputation.

Illustrations.

STAIRCASE, THE GUILDHALL, CAMBRIDGE.

THE drawing represents the grand staircase of the proposed Guildhall at Cambridge.

The view is taken from the corridor on the first floor, immediately over the entrance hall. The side flights of stairs would return and lead on to this corridor. The corridor and bridge shown in the background, together with side corridors behind the arcade form a passage all round at this level.

Beyond the bridge the staircase continues up, giving access to the crush-room and assembly and hall.

It is proposed to carry out all this work in stone, with a frieze in relief forming a rich band all round.

Mr. John Belcher is the architect.

PROPOSED NEW KURSAAL, HARROGATE.

THE Corporation of Harrogate being desirous of further developing their Spa Gardens, appointed a deputation to visit the most important Continental Spas and also had various sketch plans prepared by their Borough Engineer. A competition was then instituted and very clear conditions drawn up for the guidance of competitors.

The design placed first by their assessor (Mr. Frank Matcham), given in our illustration, shows the new buildings placed adjoining the existing ones, facing Ripon-road and leaving as much of the gardens undisturbed as possible. Advantage has been taken of the levels of ground to lower the floor about 3 ft., thus obtaining greater facilities for the new entrances and exits.

The main building consists of a large concert hall, roofed in one span, and with seating accommodation on the ground floor for 2,292 persons, and a gallery (where smoking will be allowed) wide at end and narrow at sides, sitting 718 persons, making a total seating accommodation of 3,010. In addition to this a large amount of standing space is provided in a lounge at back of gallery and in the promenade around the hall, the windows of which slide up for that purpose. The centre portion of hall has a spring floor for dancing, and the seating around is stepped to give a good view of the performances. Five entrances or exits are provided for ground-floor and two for gallery. The orchestra is arranged in an 'apsidal end with artistes' and band-room in basement leading direct from the platform.

A wide covered promenade is provided all round the hall and connected to the existing promenade by a flight of steps.

The refreshment-room and café are placed in the most pleasant position overlooking the gardens; a small kitchen and pantry under the former, and a smoking-room under the latter. Leading from the promenade is a spacious billiard-room for four tables with raised daïs and a lavatory adjoining; also a reading-room in a more retired position. The existing pump-room is converted into a ladies' retiring-room and a new pump-room constructed at end of small concert hall.

The lavatories are to be remodelled improved, and a gentlemen's cloak-room provided in basement.

One of the conditions was that as much of the existing buildings as practicable was to remain, and in this design the whole practically is retained; by this arrangement the iron and glass structures forming the present pump room, &c., form a break between the new building and the Doric façade, thus allowing of a freer treatment of the new work than would have otherwise been possible without reconstructing the elevations throughout.

The estimated cost of the proposed buildings is 20,000*l.*, and this sum would probably only permit of an inexpensive treatment of the interior decorations, hardly worthy of such a town as Harrogate.

The architect is Mr. Robert J. Beale, of London.

GOSPORT FREE LIBRARY AND TECHNICAL INSTITUTE.

THE drawings which we reproduce to-day are those submitted by the late firm of Spalding & Cross in the recent limited competition.

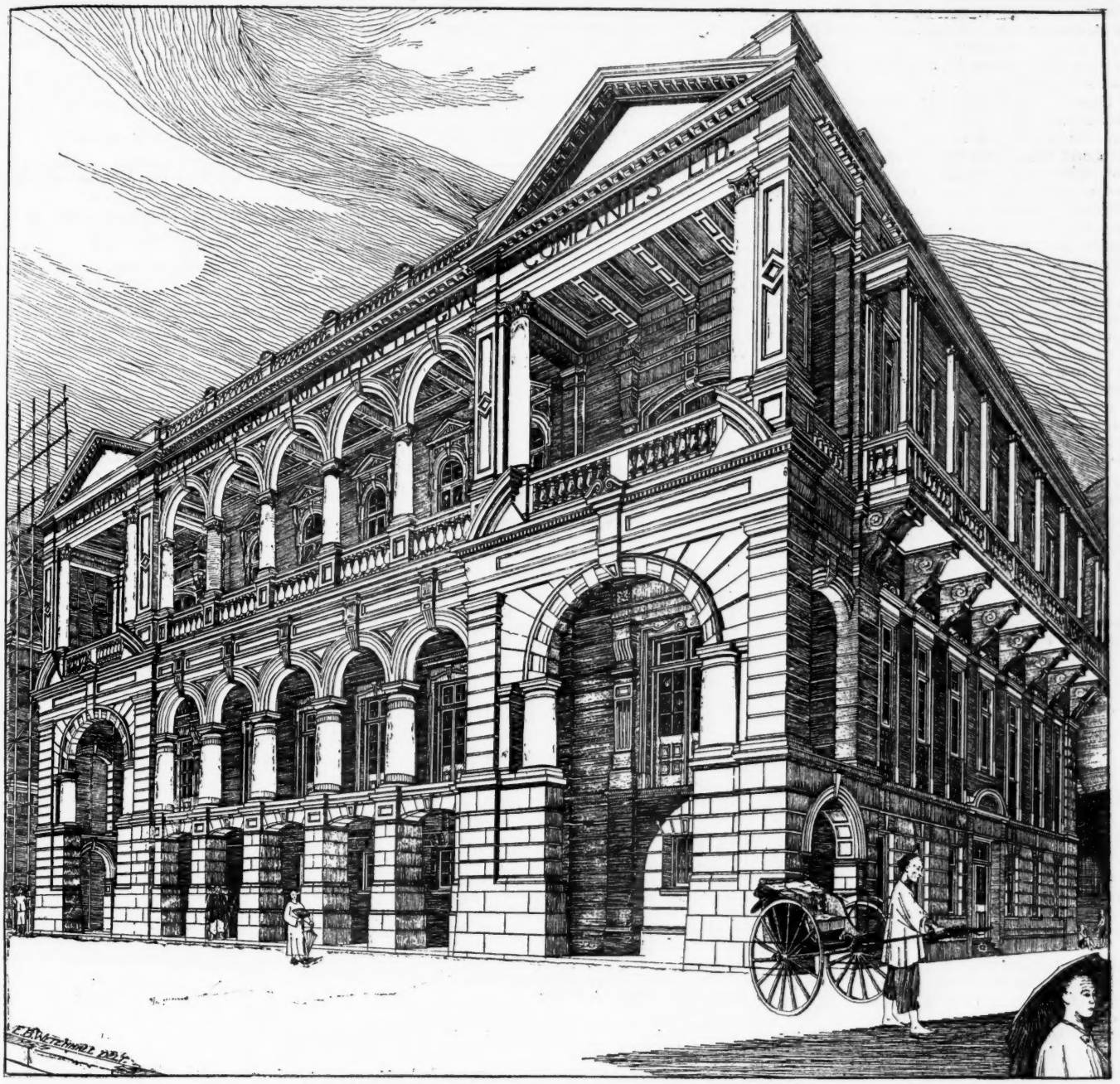
The working drawings are now being prepared by the author of the design, Mr. A. W. S. Cross, under whose supervision the building will be erected.

The public entrance to the Free Library department is placed in the centre of the Walpole-street façade, the entrance porch giving direct access to (1) the lending library, (2) the reading-room, subdivided by means of a glazed partition into a newspaper-room and a reference reading-room, both rooms being under the direct control of (3) the librarian, whose centrally-placed office affords every facility for the efficient supervision of all the rooms comprising the library department.

The rooms in the art department have been carefully arranged in accordance with the "Memorandum" issued by the Science and Art Department. They are lighted by means of windows and skylights placed in the north wall and roof of the front block.

The technical institute is placed in the return block facing Clarence-road. In designing this department due consideration has been given to the possibility of the rooms being required for the purposes of a day science school, in which case it is suggested that a doorway should be substituted for the west corridor window, marked *a* on the ground floor plan, to allow of access being obtained to the vacant land, which could then be used as a recreation ground.

In view of the limited amount it is proposed to expend upon the building (5,000*l.*), a very simple and inexpensive style of architecture has been adopted. An attempt has, however, been made to secure a picturesque effect by means of careful grouping and good outline. It is suggested that the long unbroken frieze of



New Offices, Hong Kong. Messrs. Leigh & Orange, Architects.

the front elevation could be effectively enriched by a symbolical design, illustrative of the Arts and Sciences, executed, either in sgraffito or modelled plaster, by the advanced art students under the supervision of the art master. The provision for the enrichment of this frieze has not been included in the estimate.

NEW OFFICES FOR THE AUSTRALASIA AND CHINA TELEGRAPH CO., HONG KONG.

THIS building has recently been finished, and stands on a site fronting the harbour, on reclaimed land.

The basement is in local grey granite, the upper part of the building being of brick stuccoed. It was erected throughout by native labour, the work being carried out by a Chinese contractor, under the strict supervision of the English firm of architects.

It is intended to fill the tympana of the pediments with appropriate terra-cotta figures in alto-relievo. These are being prepared by Messrs. Doulton, of Lambeth.

The architects of the building are Messrs. Leigh & Orange, of Hong Kong.

"THE CHIMES," WEST HAMPSTEAD.—The materials of the house, which stands within nearly two acres of ground at the junction of West End-lane and Quex-road, have been sold. The house, which was offered for sale at auction some years ago, was erected after the late Edward Pugin's designs for J. Rogers Herbert, R.A., who lived there many years until his death, and named the house after one of the Christmas tales of his intimate friend Charles Dickens.

CRANES, AND THE POWER TO BE USED WITH THEM.

AT the Engineering Conference of the Institution of Civil Engineers, in June last, Mr. W. Pitt, M.Inst.C.E., read the following paper, entitled, "Cranes, and the Power to be Used with Them":—

"For the purposes of this short note cranes may be considered as roughly divided into two classes—first, self-contained cranes, carrying their own motive power; and, secondly, cranes which are actuated by power conveyed to them from a separate generator. The first class practically consists of hand and steam cranes, and the second includes all the various forms of power-transmission cranes, such as shaft-driven, electric, and hydraulic. Of hand cranes it is only necessary to remark here that, wide as is the field of usefulness for moderate sizes, the practical limit is soon reached. It may be assumed that eight men is about the maximum number that can be put to the handles of a single crane; this corresponds to a total effective work at the hook of about 15 ft. tons per minute, or, put another way, it takes fifteen minutes to lift fifteen tons 15 ft. high. Speaking generally, for loads over ten to twelve tons, a hand crane is out of place, unless the circumstances are very exceptional.

The steam crane is undoubtedly the best type to use where only a single crane is required, or where several portable cranes have to be dealt with whose relative positions may be altered within wide limits, or which may at some future date be transferred to another site. In all these cases the steam-crane has advantages not possessed by any other type. It is simple to work, as economical as most of its rivals, ready at short notice, and requires little permanent work for its installation, except in the larger sizes of fixed cranes. When, however, it is a case of an overhead traveller, or several fixed cranes, or a number of portable cranes with a limited range of travel, then the consideration of other motive power than steam at once begins.

An overhead traveller is in many cases placed under cover, where a steam boiler placed close under a roof possesses obvious disadvantages, and in very many cases an available supply of power already exists. The overhead traveller has, therefore, always been well adapted for driving by transmitter power, and the evolution of the power traveller has been roughly as follows: 1st, shaft-driven traveller; 2nd, rope-driven traveller; 3rd, electro-driven traveller.

Shaft-driven travellers work very well where the motive power is not too far away, but they have disadvantages. The loss in friction is probably the greatest of all systems; the speed at which the transmitting organ (the shaft) can be driven is necessarily very limited, and the tumbler bearings are always inclined to be troublesome.

For conveying power by direct mechanical means it may be considered an axiom that a quick light drive is always to be preferred to a slow heavy one, and therefore it was a decided step in advance when the quick-running rope crane came in, and by a process of the survival of the fittest settled down into the well-known type in which the driver sits in a cage below the girders and actuates the machine by shifting open and cross belts, the speed reduction being made at the crab by worm

and wheel. The introduction of the electric transmission of power marked a noteworthy departure in crane design, and solved in a very satisfactory manner all the difficulties previously experienced in taking the power from the motor to the crane.

Electric leads are easy to erect, noiseless, motionless, cheap, and by their means power can be conveyed along routes that would be quite impracticable by any other means, and with very considerable economy. The author puts the latter point last, because although users much appreciate economy, they appreciate convenience a great deal more. Speed and convenience of working take precedence even of coal consumption.

The first electric cranes and travellers were worked by a single motor often kept running continuously, and the various motions were obtained by shifting belts or other forms of friction clutches. Latterly the practice has been to use a separate motor for each motion. Having got so far, a lesson was taken from tramway practice, and series-wound motors were used instead of the self-governing shunt-wound motor previously necessary.

The series-wound motor, with its big starting torque and its capability of responding to the driver's views as to speed, has much analogy to the engines of a steam crane regulated by the driver's hand on the starting-valve, and the writer thinks that it is precisely this possibility of using series-wound motors that is the great advantage of the single-motor machines. Jib cranes are usually now constructed as two-motor machines, one for lifting and one for slueing. The subsidiary motions of jib derricking and travelling are less often used, and can be well worked from the slueing motor by a change of gear.

The reduction of speed from motor to first motion shaft has been effected in every possible manner. Practically two methods survive, worms and cut-gear. The much-despised worm is noiseless, and very convenient to apply in many cases, and, if properly designed, even a worm will turn, and that with a very respectable efficiency. The author would remark in this connexion that the ordinary formulas for worms will, if used with proper coefficients of friction, give results well borne out by practice. The next important organ in an electric crane is the controlling gear. Here the tendency has been lately to adopt liquid resistances, and still more recently to use controllers which are practically tram-car controllers. It is a striking feature of electric crane design that whereas at first the old power traveller was the model, the tendency is now to go to tramway practice, and there are, in fact, many points of analogy between crane and tramway work, especially in all that concerns the starting and accelerating conditions. In Germany considerable attention has been paid to the problem of recovering the energy lost in lowering the load by generating current in the motor. Many of these arrangements are very interesting, but the writer doubts whether here again efficiency of doing the work required does not take precedence of current consumption, and for quick lowering nothing beats a free barrel controlled by a foot-brake.

The hydraulic crane is too well known to require long notice here. It will probably be always with us, but the electric crane will be a very serious rival. The electric crane itself is more expensive, but the generating and transmitting plant are less costly. Electric cranes are not affected by frost, and they also have the good point that the maintenance repairs are generally within the competency of the man who looks after the crane. Of various intermediate types of crane, the writer would mention a series of overhead shaft-driven travellers driven by hydraulic engines from a pressure main, and the result has been sufficiently satisfactory to warrant a repetition of the design.

Another example of a different type of motive power is furnished by a crane designed by the writer, where, a good natural supply of water under moderate pressure being available, a Pelton wheel was keyed directly on to the pinion shaft of the lifting gear, and a cheap and efficient hydraulic crane constructed. The author also remembers having seen at Bilbao a blockyard Goliath, where an electric transmission actuated a direct-acting hydraulic lifting cylinder, and there are other variations and combinations of motive power that may sometimes be authorised by the local condition. Speaking broadly, the author would emphasise the following points :—

1. For single cranes, or cranes with a great range of portability, use steam.

2. In all cases where the circumstances warrant a central power station, or where power has to be conveyed any distance, use electricity.

3. For overhead travellers, use electricity."

ARCHÆOLOGICAL SOCIETIES.

GLASGOW ARCHÆOLOGICAL SOCIETY.—The annual excursion of the members of this society took place on the 7th inst. The day's programme included a visit to Tulliallan, Culross, Pitfirrane, and Dunfermline. The company arrived before noon at Kincardine-on-Forth, whence they drove to Tulliallan, where Mr. J. Dalrymple Duncan read a paper on the history of the castle. He described it as a fine specimen of the castellated work of the fifteenth century. From Tulliallan, the party proceeded to Culross, where they examined a number of interesting old houses, including the Palace. Culross Abbey was next visited, and a descriptive paper was read by Mr. Charles Whitelaw. After luncheon, the members of the society drove to Sir Arthur Halket's castle of Pitfirrane, where they were received by the proprietor, who pointed out the many architectural features of the building, and described the numerous pictures and other objects of art which it contains. A drive to Dunfermline, and a visit to the ruins of the Abbey and Palace, where a paper was read by Mr. Duncan, brought the day's proceedings to a close.

Correspondence.

To the Editor of THE BUILDER.

STUDY FOR A SMALL COUNTRY HOUSE.

SIR,—In very many ways the plans of Mr. F. B. Cooper, published in your last issue, are excellent, and friendly criticism can do no harm to them. I would venture to suggest that the approach to the plate safe would be *safer* if from the servery. The practical value of a "terrace" is to serve as a promenade—as such, it would be somewhat limited. The dinner route is very good—near but not *too* near. The larder approach too seems right, and a left-hand light (with a north aspect) to kitchen fire deserves a good mark. The boudoir or "sulkery" (? from "Bouder"—to pout) should have some means of access other than through a bedroom ; if ever required for a dressing-room this would be necessary. I should prefer to approach the cloak-room from entrance lobby for obvious reasons.

Your remarks on the aspect of the library are just and uncontradictable, but that point could easily be rectified by transposing the window and fireplace, which could be well managed by making an "ingle" in the octagonal bay.

E. SWINFEN HARRIS.

*** Discussions on house planning are always of interest, and therefore we publish Mr. Harris's letter, but we do not agree with all of it, more especially with the remark about the access to the plate safe. The butler is confidentially entrusted with the care of the plate, and therefore entry to the safe is rightly placed out of his pantry. If the argument is that thieves could get through the pantry window and have a straight way to the safe door, they could equally get through the courtyard window—they would be very poor burglars who would be kept out by a boundary wall. In regard to the boudoir, another door would destroy the sense of seclusion. The boudoir would either be the lady's dressing-room (some ladies prefer a dresing-room separate from the bedroom), or it would be a little retiring-room for reading or writing; in either case it is a retreat through her bedroom, for her use alone, and requires no other access. In regard to the kitchen, the small window to left of the fireplace is no doubt a good point, but it would not throw direct light on the cooking operations. As the point has been raised, we may observe that the *principal* light in a kitchen should always be from the left hand in regard to the fireplace, and therefore in this case the real solution would be to put the fireplace in the east wall and the large window in the north wall.—ED.

INCISED MARK ON FONT, LEVERINGTON CHURCH.

SIR,—I have often seen the incision in the font step, mentioned in Mr. Bentley Wood's letter last week.

It merely represents an iron hinge hook, laid upon the step, and its outline sunk into the stone by a mischievous mason's apprentice. The ends of the iron arms are burred, or "set up" while hot, to give holding power when let into the joint of a stone door jamb and run with hot lead; the round hole being prepared to receive a pin of hardened iron or steel to carry the door.

The whole mysterious story finds its counterpart in Chapter XI. of "Pickwick," as to the discovery of the cottage door stone incised "Bill Stumps his mark."

F. S. A.

The Student's Column.

ROADS: THEIR CONSTRUCTION AND MAINTENANCE.

PART II.—SELECTING AND TESTING ROAD MATERIALS.

12.—ROAD STONE TESTS (*Continued*).

ABRASIVE RESISTANCE. — It has already been shown that the mechanical disintegration of road stone may be caused by the expansive force of frozen water. A more important cause of the wear of roads, however, is the constant abrasion produced by the effect of traffic, and the value of any road material must be largely determined by the resistance which it offers to this influence. Resistance to abrasion and percussive attrition depends upon the toughness of the material, and not upon its hardness. Rocks which yield easily to this form of disintegration produce roads which are muddy in wet and dusty in dry weather. Before discussing the results of the experimental tests which have been designed to imitate the effects of traffic, it is necessary to mention one fact which considerably diminishes their practical value. The samples submitted to these tests have always been taken fresh from the quarry, before the natural cohesion of the rock has been weakened by the chemical actions to which it is subjected in an ordinary road. The constant soaking in solutions of decomposing organic matter to which road metal is exposed, as has been already explained, produces a more or less rapid effect in weakening the cohesive strength by which the mineral components are held together ; so that abrasive tests applied to freshly quarried road material cannot be taken as a trustworthy guide to the behaviour of that material after it has been in use for some months.

A considerable amount of skill and ingenuity have been expended in the endeavour to reproduce artificially the mechanical influences brought into play by ordinary road traffic. This is a matter of some difficulty, and it cannot be said that any of the methods hitherto adopted are altogether satisfactory. Perhaps the most useful is the rotary testing machine designed by Mr. T. de Courcy Meade, and used by Mr. Lovegrove in a series of comparative tests of considerable interest and value. This machine consists of three cylinders, having an internal diameter of 11½ in., on the inside of each of which are rivetted three iron ribs, having a square section of 1 in., and placed lengthwise on the circumference. The cylinders are made to revolve at a speed of twenty revolutions per minute by means of a gas engine.

In performing the test, a certain weight, say 4 lbs., of broken stone is placed in the cylinders and subjected to 8,000 revolutions, after which the stones are again weighed, as well as the chips and dust produced by their attrition. The same test is performed both dry and wet. For the latter purpose about half a gallon of water is put into each cylinder with the stones. The quantity of dust produced, as well as the size and shape of the chips, vary with the nature of the stone employed in each test. It is not necessary to give here the full details of Mr. Lovegrove's exhaustive experiments, but the results obtained with about forty representative British road stones confirm the following facts.

1. That in general more abrasion take place in the presence of water than in a dry state. An exception to this rule appears to hold in the case of quartzite and flints, which in many cases suffered less when wet than when dry.

2. The igneous rocks, as might be expected, proved tougher than rocks of sedimentary origin. Their total loss ranged between 3 and 10 per cent. The range of loss in limestone rocks varied between 10 and 35 per cent., that of flints between 8 and 26 per cent. The sandstones averaged 14 per cent. of loss, and slag only 8 per cent.

3. The loss in the igneous rocks and slags was chiefly in the form of dust, but very few chips being produced. In the case of flints and limestones a large proportion of chips was

obtained. This latter result is, no doubt, due to the brittle conchoidal fracture of flint, and, in the case of limestone, to the weakness of the calcite cleavage planes. Cherbourg quartzite produced as much as 50 per cent. of its loss in the form of chips, and some gravel-pit flints gave even a higher result, nearly 60 per cent. of the loss being due to chips. The superior toughness of Hartshill quartzite, which, as has been already shown, does not possess the conchoidal fracture of flinty rocks, was made evident by the fact that its loss was in the form of dust alone, no chips being produced.

In the above-mentioned tests the abrasion is produced partly by the fixed iron ribs and partly by the mutual friction of the stones amongst themselves. In other forms of abrasion cylinders, pieces of iron are put in loose with the stones. This method, however, is obviously not so good, as a certain amount of iron-dust must be produced by the mutual friction of the iron.

In a road the stone is more or less fixed during abrasion. Tests with fixed stones are usually made by pressing them with a uniform pressure against a grindstone, and noting the loss after a certain number of revolutions. This method was adopted many years ago by Mr. Walker in a series of comparative tests upon Guernsey, Aberdeen, and Peterhead granites; but the test is now seldom used.

The results of all such tests must be received with a certain amount of caution. They are not strictly comparative unless all the circumstances of size and shape are identical. An irregular fragment with sharp angles would not behave quite like the same material cut to a cubical shape. Neither can it be said that the conditions of road traffic are successfully imitated in any of these rotary machines.

Weathering Tests.—The liability of stone to disintegrate by the action of frosts depends partly upon its porosity and absorptive power, and partly upon the presence of planes of weakness, such as the lamination planes of natural flagstones. Brard's process was at one time employed to imitate the effect of frost upon rocks. A weighed sample of the stone was soaked in a saturated solution of sulphate of soda (Glauber's salt), and then left to dry. The crystallisation of the salt in the pores of the stone was supposed to produce a mechanical force similar to that exerted by the expansion of water on freezing. The loss by disintegration was estimated by again weighing the sample after the experiment. The process has not survived, since at the present day it is found easier to reproduce the actual result of frost by artificially freezing the sample after prolonged soaking in water, and determining the loss of weight after thawing and drying the stone. It is doubtful whether such tests are of much value except, perhaps, in the case of flagstones; for stones which are sufficiently porous to disintegrate in this way would be quite unsuitable for use as road material.

Percussion Tests.—The pounding influence upon a road resulting from the continued impact of horses' feet is one of the chief causes of the mechanical disintegration of road stone. This action is not reproduced in any of the attrition tests described above, but may be approximately imitated by what is known as the *drop test*, in which toughness is estimated by counting the number of blows by a hammer required to reduce the rock fragment to powder. The following results are amongst some obtained by Mr. Clark, of Truro, in his experiments on Cornish road-stones. He used a 15 lb. hammer, having a drop of 10 in., on to an anvil on which was placed 3 lbs. of the sample to be tested, broken to such a size as would pass in all directions through a 2¼ in. ring. The blows were continued until all the stone was small enough to pass through a sieve having a ¼ in. mesh.

Sample of Stone.	No of Blows.
Quartz	265
Quartz	295
Devonian Sandstone	440
Quartzite	451
Scotch Whinstone	454
Elvan	639
Clee Hills Basalt	724
Elvan (Penzance)	894
Greenstone ,,	909

The principle of this method seems to be good, and for the purpose of testing macadam might prove extremely useful if sufficient care is taken to make the tests strictly comparative. It would be interesting to compare machine broken and hand broken samples of the same stone by this method; for any flaws and incipient cracks produced by crushing in a stone-breaking machine should render the stone more susceptible to blows from a hammer than hand-broken fragments would be.

Compressive Strength.—If the importance of this factor of a stone is measured by the prominence given to it in quarry advertisements, its estimation will stand in the front rank of artificial road stone tests. It is usual, for the purpose of applying this test, to employ a hydraulic press, a cube of the stone to be tested being placed between the two flat dies of the press and the pressures noted at which the specimen is first cracked and afterwards completely crushed. At first sight this test would seem to possess the advantages of not only giving definite numerical results, but also of affording a means of arriving with some degree of certainty at the comparative values of different classes of stone. In fact, however, nothing is more delusive. Experiments performed on the same kind of stone often give results which vary within very considerable limits, a discrepancy which is not to be overcome by the simple device of taking an average of several tests performed upon different samples of the same stone.

The reasons for this variation in crushing-strength tests may be summed up as follows:—

1. Variations due to inherent flaws in the samples.

2. Small variations in mineralogical structure.

3. Carelessness in the preparation of the cubes for testing. The small 6-in. cubes usually adopted for this test are not large enough except for fine-grained homogeneous rocks. With coarse-grained rocks—such, for example, as the porphyritic igneous rocks—correct results could not be obtained unless cubes of a much larger size are employed.

In the preparation of the cubes it is almost impossible to avoid the production of minute cracks or flaws, which exert an important influence upon their compressive resistance. Small cubes are not a fair sample of a rock possessing local differences in structure, although it is maintained by some experimenters that the crushing strength of large blocks can be deduced by calculation from the results obtained with small cubes, since they hold that a definite ratio exists between them. Such a conclusion, however, is based upon purely theoretical grounds, and cannot be accepted as established fact. From what has already been said concerning the rift of granite, it is evident that the mere position of the cube in the press would affect the result in many cases.

Then, again, with regard to the preparation of the cube for testing it must be remembered that the steel dies of the hydraulic press are themselves mathematically parallel to one another, or, at any rate, they should be so to produce results of any value whatever. But if the faces of the cubes of stone are not also precisely parallel, the results of the tests must necessarily be vitiated, since the pressure, instead of being evenly distributed over the surface of the cube, would be exerted only on a part of it, causing an uneven strain which must tend to lower the crushing weight. An attempt is generally made to overcome any small want of parallelism in the faces of the cube by inserting some yielding substance, such as pitch-pine or thin sheets of lead, between the steel dies and the cube, a procedure which of itself must affect the result; although some such device is absolutely essential, if the figures obtained are to be in any sense comparative, unless the cubes are perfectly and mathematically true. The utmost that can be said is that the introduction of a thin yielding sheet enables better results to be obtained.

Again, freshly-cut cubes, if full of quarry water, will contract unequally in drying. All cubes should, therefore, be cut from perfectly dry samples of stone, and care should be taken that the specimens are as homogeneous as possible, and free from veins, concretions, or any other abnormal peculiarities.

Stones when placed in a roadway, whether used for kerbs, setts, or macadam, are subjected to quite a different kind of stress to the gentle, uniform, vertical pressure of the hydraulic press. Lateral stresses also come into force, and frequently with such a suddenness of impact as only stones of exceptional toughness can withstand.

The obvious conclusion, therefore, is that published results of crushing strength, however useful they may be in estimating the value of building stones, are to be accepted with the greatest caution in the selection of road material.

Chemical Analysis.—It has already been pointed out, and the fact cannot be too strongly emphasised, that the durability of road stone depends partly upon its resistance to atmospheric decomposition, and partly upon its resistance to mechanical abrasion. The former character is influenced chiefly by the chemical composition of the constituent minerals, while the latter depends upon the manner in which, and the material by which, these component minerals are aggregated into a compact mass. Sir J. MacNeill estimates the proportionate wear of roads as follows:—

	For Fast Traffic.	For Slow Traffic.
Atmospheric changes ..	20 per cent.	.. 20 per cent.
Wheels	20 ,,	.. 35·5 ,,
Horses' feet	60 ,,	.. 44·5 ,,

There is also this difference, that whereas the mechanical wear takes place chiefly on the surface of the road, chemical decomposition may, and often does, produce its chief effect in the substratal portions, where the result is more disastrous. It is especially necessary, therefore, that road foundations and substratal pavements should be made of chemically durable material.

It is, however, doubtful how far a chemical analysis of a rock is of much value in enabling a durable road stone to be selected. The table given in the fourth article of this series shows at a glance how deceptive the result of chemical analysis may be. Thus, it would obviously be absurd to rely upon silica percentage alone; for under these circumstances the most friable sandstone would excel the most durable granite.

As regards sandstones, chemical analyses may assist in the determination of the nature of the cementing material, but in the case of limestones such data are not sufficient in all cases to enable a good road metal to be distinguished from one which is worthless. There is a considerable difference in the quality of limestones, even when procured from the same geological formation. Thus the Bristol Black rock is one of the best beds of carboniferous limestone for use as macadam, but chemically it has little to distinguish it from other inferior varieties of the mountain limestone formation. The same may be said of many of the Devonian limestones, none of which can excel the Babbacombe stone for road making, although in appearance and chemical composition there is often a great similarity.

A word may here be said upon the practice of testing limestones by their behaviour with dilute acid. Some of the more weathered trap rocks effervesce freely with acid and might thus be mistaken for limestone. On the other hand, some of the harder dolomites have been mistaken for quartzites owing to the fact that dolomite does not readily effervesce in cold dilute acids. In such cases as these even a rough chemical analysis would at once reveal the true nature of the stone.

It is not intended, therefore, to convey the impression that chemical tests are useless, but only that *alone* they are often insufficient. A road surveyor cannot know his materials too thoroughly, and the chemical composition, when combined with a proper understanding of mineralogical structure, may afford much valuable information, and may assist in the discrimination of good and bad samples.

Mineralogical Composition.—The importance of this test has already abundantly been illustrated in our discussion of the different rock groups. A mere examination of a hand specimen is not enough to determine its mineralogical constitution. Microscopic investigation will alone reveal the true nature of the component minerals, their interlocking, decompositions, and alterations, as well as the presence of secondary products, such as calcite or pyrites, which may affect the chemical stability of the rock.

Observations of Actual Wear.—The test of actual experience, although the last to be considered, undoubtedly surpasses any other means of determining the value of road metal. The number of experimental pavements which have been laid in this country is, however, not many; although there are innumerable instances in which selected material has been afterwards discarded on account of the unfavourable results obtained from its use. Some of these failures have been the result of faulty construction, and cannot, therefore, be laid to

the quality of the material; but in many other cases it is the material which has been at fault. The quality of the stone selected may even be too good for the purpose for which it is intended. In London, harder stone has often been removed on account of its slipperiness, and less durable but rough-wearing setts substituted for it. Liability to wear to a smooth, slippery surface is a feature which is often difficult to estimate in any other way than by actual trial. In the selection of macadam this element of slipperiness is unimportant, and the harder varieties of stone are to be preferred. Flagstones exhibit great differences in this respect, the Blue Lias flagging, although durable, being inferior to such siliceous flagstones as those of Caithness, Kilrush, or Yorkshire, on account of their tendency to wear to a smooth and polished surface.

In concluding these remarks on the selection of road material, the following table, drawn up by Mr. H. P. Boulnois, will exemplify at a glance the many different qualities which have to be considered in estimating the relative advantages of different kinds of material:—

Kind of Pavement.	Ease of traction.	Foothold.	Cleanliness.	Noiselessness.	Durability.	Economy.	Facility of repair.	Impermeability.	Suitability to all classes of traffic.	Suitability to all gradients.	Uniformity of wear.	Appearance.
Asphalte	1	4	1	2	2	2	1	1	2	4	2	1
Bricks	2	1	3	3	3	3	3	3	3	1	4	3
Granite	4	3	2	4	1	1	2	2	4	2	1	4
Wood	3	2	4	1	4	4	4	4	1	3	3	2

Such tables, drawn up for all classes of stone, both for paved roads and macadam, would be extremely useful for the road surveyor, and would supply more practical information than any quantity of physical tests. Quoting again from the same authority, Mr. Boulnois says: "Actual time test under observation of real conditions is the only reliable method, and having thus decided, *see that you get the genuine article you have selected.*" It is here that the value of a knowledge of tests may be useful. Variations in quality, even of first-class stone, are frequent. There are good veins and inferior veins in the same quarry, and the subjection of occasional samples to physical tests will at least assist in insuring a uniform standard of quality.

OBITUARY.

MR. WILLIAM JURD.—The death is announced of Mr. William Jurd, of the firm of Jurd & Sanders, architects, of Southampton. Deceased was in his seventieth year.

GENERAL BUILDING NEWS.

CHURCH, CARLISLE.—The foundation-stone of a church, which is being built in Warwick-road, Carlisle, was laid on the 8th inst. The architect is Mr. C. J. Ferguson.

PARISH CHURCH, SPRINGBURN, LANARK.—The new parish church at Springburn was opened on the 3rd inst. The architect was Mr. James Lindsay, of Glasgow.

NEW CLUB, RUNCORN.—New buildings for the Runcorn Constitutional Club are to be erected on a permanent site in Greenway-road in that town, from designs by Mr. Samuel Davies, architect, of Runcorn and Frodsham.

POLICE-STATION, HALLSIDE, LANARK.—A police-station has been built on a site between the village of Hallside and Halfway. The architect was Mr. Paterson, of Edinburgh, and the following were the contractors:—Masonry, Messrs. J. Frame & Son, Cambuslang; joinery, Mr. J. C. Burns, Larkhall; slating and plastering, Mr. Taylor, Larkhall; painting, Mr. Mason, Cambuslang; and ventilating, Messrs. Lumsden & Son, Glasgow.

PARISH COUNCIL CHAMBERS, HELENSBURGH, DUMBARTON.—New offices for the Row Parish Council are about to be erected on a site in West King-street, Helensburgh. The plans have been prepared by Mr. Robert Wemyss, architect, of Glasgow and Helensburgh.

COTTAGE HOSPITAL, BISHOP AUCKLAND, DURHAM.—A cottage hospital for miners was opened at Bishop Auckland on the 8th inst. The architect of the building was Mr. J. Garry, of West Hartlepool, and the builder was Mr. G. R. Bell.

PROPOSED SMALLPOX HOSPITAL, LEEDS.—Dr. S. W. Wheaton, an inspector to the Local Government Board, conducted a public inquiry, on the 7th inst., at the Leeds Town Hall, into the application of the City Council for sanction to a loan of 21,250*l.* for the purchase of the Killingbeck Hall Estate as a site for a smallpox hospital. The architect of the proposed buildings is Mr. E. T. Hall.

CRICKET PAVILION, BLYTH.—The new cricket pavilion erected in the grounds of the Blyth Town Club at Blagdon-terrace was recently opened. Mr. W. E. L. Thompson was the architect.

BATHS AND WASHHOUSES, BATTERSEA.—The foundation stone was laid on the 9th inst. of the baths and washhouses which are to be erected in Nine Elms-lane. The architect is Mr. F. J. Smith.

ELECTRIC POWER STATION, NEWCASTLE-ON-TYNE.—In connexion with the electric tram system about to be adopted at Newcastle-on-Tyne, we are informed that an electric power station is to be erected, for which Mr. B. F. Simpson and Mr. J. Savage, of that city, have been appointed architect and quantity surveyor respectively.

CHURCH RESTORATION, GREAT EASTON.—The church at Great Easton has recently undergone a thorough restoration, and some oak work has been added to the interior of the building. The restoration has consisted of the removal of the gallery, erecting a new pitch-pine roof to the nave, a new oak roof to the chancel, and new choir stalls. The old chancel arch, constructed of lath and plaster, has been removed, and replaced by a new stone arch, and a rood beam has been erected across the chancel arch, with carved oak crucifix. The work has been executed by Messrs. W. Bell & Sons, of Saffron Walden and Cambridge, under the supervision of Mr. Richard Creed, of London and Great Bardfield.—*Essex Weekly News.*

PUBLIC BATHS, WINCHESTER.—A Local Government Board enquiry was held on the 8th inst. by Mr. H. H. Law, at the Guildhall, Winchester, into the application of the City Council for sanction to borrow 7,000*l.* for the erection of public baths. The Town Clerk stated that the proposed buildings would be erected on a site which had a frontage of 213 ft. to the North Walls, 102 ft. to Lower Brook-street, and a depth of 86 ft. The site had been purchased for 800*l.* from Winchester College. The Council had advertised for plans, and those of Messrs. Lansdell & Harrison, of London, had been accepted

PROPOSED TOWN HALL, NORWICH.—At a meeting of the Norwich Town Council, held on the 5th inst., the question of the new town hall was further considered. The City Committee had drawn up a minute as follows:—"That the committee, having considered the question of the Municipal Buildings referred to them by a resolution of the Council of December 13, 1898, is of opinion that any adaptation of the present offices would be wasteful and inadvisable, and that the requirements of the city can only be satisfactorily met by the erection of new suitable buildings on the present and contiguous sites. They therefore recommend that the Council should at once, for this purpose, empower the committee to submit a scheme to the Council for the purpose of remedying the evils referred to in the Council's resolution of December 13, 1898." After prolonged debate it was agreed that the matter should stand adjourned until the 26th inst.

BANK PREMISES, CHESTER-LE-STREET.—Messrs. Hodgson, Barnett, Pease, Spence, & Co., have opened a block of new premises at Chester-le-street. The building is from the designs of Mr. Stephen Wilkinson, of Newcastle and Chester-le-Street.

ADDITIONS TO ASYLUM, NORWICH.—A recommendation of the Visiting Committee of the Norwich City Asylum in reference to the enlargement of the building was brought up at a meeting of the Town Council on the 5th inst. It proposed that the resolutions passed by the Council on March 16, 1897, in reference to the enlargement of the asylum, be rescinded, and recommending that a new scheme for enlarging the asylum at an estimated cost of 6,798*l.* be carried out for the following purposes—(1) To provide accommodation for twenty-six additional beds on the male side of the asylum for epileptic patients. (2) To provide additional day room accommodation proportionate to the above increase in the dormitory accommodation for patients. (3) To triple the existing capacity of male and female attendants' mess rooms and dormitories, and thereby set free four beds on each side of the asylum. (4) To make additions to the sanitary conveniences, which are inadequate to the existing number of patients. (5) To adjust and extend the heating apparatus and extend the lighting and water supply. (6) To provide four additional exits in case of fire or panic. It is recommended that application be made to the Local Government Board for consent to borrow not exceeding 6,798*l.*, the estimated sum required to carry out the scheme, and that necessary steps be taken by the Town Clerk to obtain the consent of the Local Government Board to the application. On a division the recommendation was carried by a large majority.

TECHNICAL SCHOOL, BOOTLE.—According to the *Liverpool Courier*, the new building intended for a municipal technical school for Bootle is nearing completion. Most of the walls are up to the first floor, the roof timbers of the workshops at the rear from Balliol road, and of the physical lecture theatre, are being put on; and the general assembly-room will soon be ready for the roof-tree. To the right of the principal entrance in Balliol-road are offices and class-rooms, and to the left are other administrative offices and a teachers' common room. The ground-floor of the left wing is occupied by rooms devoted to domestic economy, with the women's corridor and an additional entrance at the side. Over this will be the chemistry department, and over the main frontage a suite of rooms for an art school. In the centre of the front elevation will be a tower. The right wing will form the Pembroke-road frontage, the ground-floor being mainly devoted to a suite of rooms for the teaching of physics. The floor above on this side will give additional ordinary class-rooms and a room for the teaching of mechanical drawing. It is expected before long that the fitting up of the millwrights' work for the engineering, woodworking, and plumbing shops will be determined on. It is intended to run the machinery by an electro-motor. The architects are Messrs. Best & Callon, of Westminster, and the contractor Mr. J. Corkhill. The cost of the building and fixed furniture is to be 22,065*l.*

BUILDING ACTIVITY IN ABERDEEN.—The Plans Committee of the Town Council have sanctioned the following plans:—Seven dwelling-houses on the north side of a new street to be laid out (through the property of Hollybank) between Holburn-street and Hardgate, for Mr. A. L. Robb, builder; two dwelling-houses on the west side of Holburn-street, for Mr. William Alexander, Cluny, per Messrs. Walker & Duncan, architects; two dwelling-houses on the north side of Bedford-place, for Mr. George Fraser, agent, per Mr. William Robertson, Jasmine-terrace; dwelling-house on the west side of Gray-street, for Mr. Alexander Anderson, builder, per Messrs. Brown & Watt, architects; alterations on warehouse in connexion with the North of Scotland Distillery, Hardgate, for the Daluaine-Talisker Distillery Co., Limited, per Mr. Charles C. Doig, architect, Elgin; alterations and additions in connexion with premises on the west side of Charlotte-street, for Messrs. John M'Adam & Sons, contractors, per Messrs. Brown & Watt, architects; additions in connexion with warehouse on the north side of John-street, for Messrs. Glegg & Thomson, iron merchants, per Mr. R. G. Wilson, architect; (a) alterations and additions in connexion with dwelling-house No. 168, Holburn-street; and (b) workshop at the rear of the dwelling-house, for Mr. S. Simpson, carpenter, per Mr. R. G. Wilson, architect.—*Aberdeen Journal.*

WORKHOUSE RECONSTRUCTION, PADDINGTON.—At a recent meeting of the Paddington Board of Guardians, instructions were given to the Building Committee to devise means to increase the accommodation for female sick inmates, to improve the board-room and office accommodation, and to provide a home for the nursing staff. After consultation with the architect, Mr. F. J. Smith, of Parliament-mansions, Victoria-street, the Committee submitted a plan on March 1, 1899, together with the following report descriptive of the alterations proposed, viz.:—The plan involves the demolition of the men's wing of the south block, and it will, therefore, be necessary to provide accommodation elsewhere for the able-bodied and aged men who are now located in this building. The committee are making inquiries with a view of finding temporary accommodation for these classes. When the present men's quarters have been removed, it is proposed to erect a four-storey building similar to the male block of the infirmary, containing the same accommodation (142 beds), and parallel to it, but at a distance of 118 ft. therefrom. The nurses' home will be placed at the north-east extremity of the proposed new building, immediately opposite to the infirmary administrative block. It is suggested that the lunacy wards should be built on the site of the present relief offices and dispensary, and, in the event of the London County Council establishing receiving houses for lunatics, the wards can be utilised as receiving wards for the infirmary, or otherwise. It is proposed to erect the new Board-room and offices, dispensary, and relieving offices on the Harrow-road frontage, adjoining the Woodfield-road.

SCHOOL BUILDINGS, NEWCASTLE-ON-TYNE.—The school buildings erected on Westgate-hill, for the Newcastle School Board, were opened on the 4th inst. The school is planned with three stories; the ground floor being devoted to the infants, the first floor to the junior mixed department, and the upper floor to the seniors. Separate staircases are provided from the ground to the first floor, and from

the ground to the upper floor—four staircases in all. On each floor there is a central hall, 60 ft. by 30 ft., having its long side filled with windows, and facing the south. Round the halls are grouped the schools and class-rooms. On the upper floor there are five class-rooms, each for 60 children; and two schools for 92 each, providing in all 548 places in the senior and mixed department, including 100 in the central hall. On the first floor are five class-rooms, the same as above, and two schools for 70 each, the central hall holding 100—total, 540. The infants' department contains four class-rooms for 60 each, a babies' room for 50, and the hall 100—a total of 390. The three departments provide accommodation for 1,514 children. As the infants do not require the same amount of space given for children upon the upper floors, covered playgrounds are provided under the wings of the building, facing south. Large cloak-rooms are placed on each floor, at either end of the building, for boys and for girls. There are also private rooms for the teachers, with lavatories adjoining. These are arranged upon the mezzanine floor between each main story. All rooms are amply lighted, and the windows are arranged so that the desks have the light upon the left hand. The whole building is warmed by hot-water apparatus, having ventilating coils. There are ventilators in every room, connected with two large upcast shafts, through which foul air is extracted, and they are arranged so as to renew the air three times in every hour. This work has been carried out by Messrs. Emley & Sons, Newcastle. The school is built of bricks, with terra-cotta dressings, as well as the new boundary-wall facing Westgate Hill. The road is widened and improved at this point. The playgrounds are laid entirely with cement. A small house for the caretaker is placed near Westgate Hill. It contains three rooms and washhouse, with offices and yard upon the ground floor, and upstairs three bedrooms and a bath-room, fitted with hot and cold water. The upper story is of half-timber work, partly covered with upright tiling; the whole harmonising with the main building in the background. The contractor is Mr. Thomas Lumsden, of Jarrow, and the architects are Messrs. Dunn, Hansom, & Fenwicke, of Eldon-street, Newcastle.

BUSINESS PREMISES, DUBLIN.—Two blocks of buildings are in course of erection in Exchequer-street. One is a furniture warehouse for Messrs. Pim, and the other a block of four shops for the South City Markets Company. Both buildings are of brick, and are being erected by Messrs. J. & P. Good. Mr. Mitchell is the architect of Messrs. Pim's premises, and the plans for the Market Company's buildings were prepared by Mr. Byrne.

SANITARY AND ENGINEERING NEWS.

NEW FILTER BED, LOUGHBOROUGH WATERWORKS.—A new filter bed, the fifth of the series, was opened at Loughborough Waterworks on the 6th inst. The floor of the new bed is of blue bricks, with a main channel at the bottom, and on the floor are two courses of common bricks, laid dry. On these bricks is the filtering material, which consists of 3 ft. 6 in. of sand on 1 ft. of gravel. The water is supplied by two 8-in. pipes from the adjacent reservoir and the Blackbrook, and after passing from the filter bed it enters one of the two water-wells from which start the mains for the supply of the borough. The construction of the bed was commenced in April last, the Town Council placing the work in the hands of Mr. J. F. Price of Nottingham. The plans were prepared by Mr. A. H Walker, the Borough Surveyor, and Mr. T. W. Widnell has been clerk of the works. The cost was about 1,400*l*.

CONCRETE SLABS AND METAL.—A joint meeting of representatives of the Northern Architectural Association, the Newcastle, Gateshead, and Tyne District Master Builders' Association, and the Council of the Building Trades' Exchange, was appointed in March last to organise and carry out an independent test of the comparative breaking strengths of concrete slabs made with and without the addition of "expanded metal." The details were left in the hands of a sub-committee, under whose supervision twelve slabs were set up on wood centerings and brick piers in the foundry yard of the Gallowgate Iron Works on July 20 and 24 last, the centerings being removed on August 16. It is intended to submit the slabs to breaking load tests on Tuesday, the 19th inst., between the hours of 10 a.m. and 1 p.m., and 2.30 and 5 p.m. Architects, contractors, and others interested are invited to be present. The test pieces consist of three slabs 8 in. thick of concrete only; three 5 in. thick of concrete and No. 10 expanded metal; three 4½ in. thick of concrete only, and three 3 in. thick of concrete and No. 8 expanded metal. In regard to size the slabs are in three groups of four each, respectively 8 ft. by 4 ft., 6 ft. 6 in. by 4 ft., and 5 ft. by 4 ft., each class of slab being tested in three sizes.

POLLUTION OF THE RIVER CLYDE.—In the action in Hamilton Sheriff Court at the instance of the County Council of Lanark against the Commissioners of Police of the burgh of Motherwell, in which petitioners seek to ordain the defenders to abstain from causing to fall or flow or to be carried into the Clyde or its tributaries any solid or liquid sewage matter, Sheriff Davidson has just issued his judgment on the preliminary pleas, which were debated before him by counsel some time ago. He rejects the principal pleas, and allows the parties a proof. In his note he says:—With the exception of the plea that all parties are not called, the arguments adduced for the defenders all resolve themselves into this, that the Rivers Pollution Act, 1876, is one to be put in force only at the discretion of the Court, and that in the present instance its application is opposed to public policy. He did not think that the plea of all parties not being called was tenable. If it were a good defence, all that it would be necessary for the defenders to do was to show that some one else—it might be a single individual—discharged sewage into the Clyde as well as themselves. As regards the main defence, he was of opinion that it was not well founded.

CANAL EMBANKMENT WASHED AWAY.—Early on the morning of the 9th inst. the embankment of the Birmingham and Wolverhampton Canal gave way at a point about half-way between Albion and Dudley Port Stations on the London and North-Western Railway. Fortunately, no lives have been lost, but an immense amount of damage has been done. The Stour Valley line runs along one side of the canal, and almost on an exact level with it for a considerable distance, but on the other side there is a steep embankment. It was this embankment which gave way, causing the water to rush out in an immense torrent, flooding a deep marl pit belonging to Messrs. S. Barnett, brickmakers, and covering many acres of low-lying land with several feet of water.

THE INSTITUTE OF SANITARY ENGINEERS.—At a meeting of the Election Committee of this Institute, held on the 6th inst., the following were elected Members:—J. E. Hamilton de Key, Wellingborough; J. E. Haynes, Stroud; J. Allan, Camberwell; S. Babu Rao, Mylapore, Madras. Associate, H. Hughes, Menai Bridge.

STAINED GLASS AND DECORATION.

MEMORIAL WINDOW, ST. JOHN'S CHURCH, CASTLESIDE, NEWCASTLE-ON-TYNE.—A two-light stained-glass window to the memory of the late vicar of the parish was unveiled recently in this church. The window was designed and executed by Mr. Alfred O. Hemming, of London.

MEMORIAL WINDOW, E.U. CHURCH, AIRDRIE, N.B.—Two stained-glass memorial windows have just been unveiled in this church. The artist was Mr. Norman M'Dougall, of Glasgow.

FOREIGN.

FRANCE.—The ancient church of St. Séverin, at Paris, is to be disencumbered from the surrounding buildings, preparatory to undergoing some necessary repairs.——The Hôpital Troupeau in the Faubourg St. Antoine, founded at the close of the seventeenth century, is to be shortly pulled down.——M. Ferdin and M. Humbert have completed the eight decorative panels commissioned by the State for the transept of the Panthéon. The first panel represents a group of fishermen returning by moonlight from the sea, with a frieze beneath symbolising "Hope." The second, representing a sunset landscape with figures, represents Family Life, with a frieze symbolising Work and Prosperity. Further on the idea of Liberty and Patriotism is represented by the incident of a young man leaving his home to fight for his country. In the two last compositions of the series Charity and Humanity are symbolised.——The citizens of Philadelphia are proposing to present to the city of Paris, next year, a statue of Benjamin Franklin to be erected at Passy, and to be a reproduction of the statue at Philadelphia.

MISCELLANEOUS.

MONUMENT, ABERDEEN.—A memorial is to be erected in Aberdeen by the officers and men of the 1st Battalion Gordon Highlanders in memory of comrades who fell on the Indian North-West Frontier. The monument, which consists of a triangular shaft of granite surmounted by a bronze statuette of "Victory," was designed by Mr. William Kelly, architect, Aberdeen, and will be placed on the open ground in front of the Gray School of Art, near the statue of General Gordon erected by the Clan Gordon.

WESTMINSTER TECHNICAL INSTITUTE. — This Institute, in Vincent-square, reopens for the Session on Monday, September 18. Fifty scholarships will be offered for competition.

THE BRANKSEA ISLAND ESTATE.—This property, extending over 743 acres, having been withdrawn (with a reserve price of, we understand, 40,000*l*.) from the recent sale at auction, July 13, is now to be disposed of by private treaty. Of Branksea, or Brownsea, Castle, owned by Captain Kenneth R. Balfour, an account will be found in the *Builder* of May 20 last, together with an illustration of the interior of the south hall; the castle, gutted by fire on January 26, 1896, has been completely restored, and enlarged, from Mr. R. S. Balfour's plans and designs.

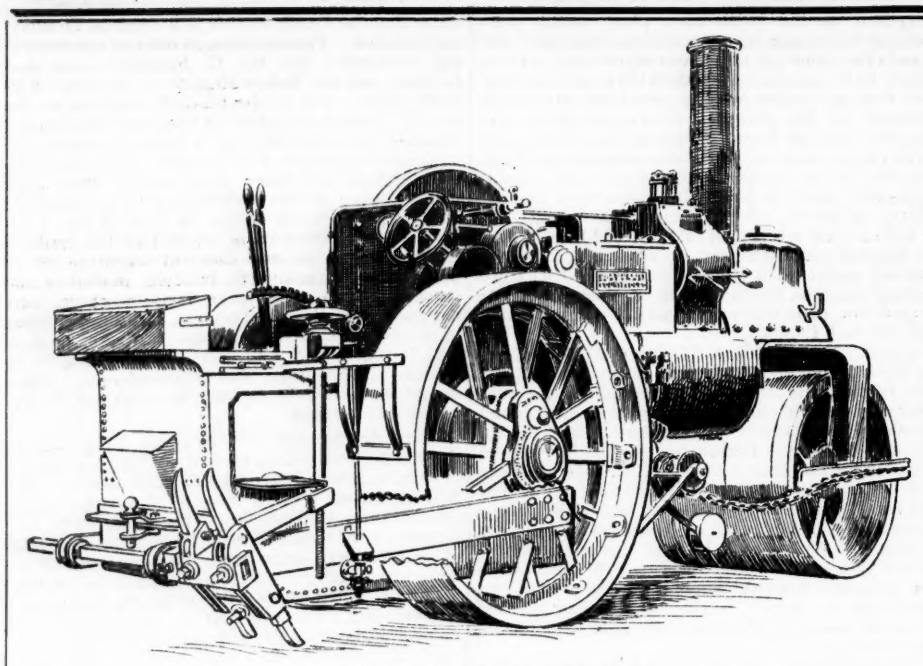
CENTRAL SCHOOL OF ARTS AND CRAFTS.—The prospectus of the Central School of Arts and Crafts states that the fourth session will open on Monday, the 18th inst. The directors, as most of our readers will remember, are Mr. G. Frampton and Mr. Lethaby, and Mr. Halsey Ricardo is the teacher in architecture. The prospectus calls attention to the fact that there is no intention that the school should supplant apprenticeship—it is rather intended that it should supplement it by enabling its students to learn design and those branches of their craft which, owing to the sub-division of processes of production, they are unable to learn in the workshop. The instruction is adapted to the needs of those engaged in the different departments of building work (architects, builders, modellers and carvers, gilders, decorators, metal workers, &c.), designers in wall papers, textiles, furniture, workers in stained glass, tapestry, bronze, lead, &c., enamellers, jewellers and gold and silver workers, bookbinders, illuminators, and embroiderers. Other departments will be opened in response to any reasonable demand.

GLASGOW SCHOOL OF ART.—We have received the prospectus for 1899-1900 of the Glasgow School of Art, conducted by Mr. F. H. Newbery. The scheme includes every branch of artistic study. Architectural students learn the elements of construction; the nature of materials and the mechanics of architecture; draw from the cast; study the historical development of architecture in Europe; acquire a knowledge of the principles and growth of ornament; measure and sketch buildings and receive instruction in architectural design. Concurrently with this, they study drawing and modelling from the antique and life, and attend, as far as possible, the lectures on ornamental design; anatomy and proportion and figure design and decoration. They are specially prepared for the examinations of the Royal Institute of British Architects. The school was founded in 1840; but new buildings were commenced last year, from the designs of Messrs. Honeyman & Keppie; two-thirds of this building is completed, and the present session is begun in the new premises.

EAST LONDON TECHNICAL COLLEGE. — The session of the East London Technical College, People's Palace, opens on the 25th inst. The programme includes engineering, art, chemistry and physics, building construction, &c. A library and reading-room, social rooms for men and women, a refreshment department, and a bookstall are provided for the use of students, who are also admitted to the swimming bath at a reduced charge. Various societies have been formed by the students amongst themselves, including engineering, chemical, literary and debating, electrical and sketching.

A PHOTOGRAPHIC TIME RECORDER.—This is a very ingenious machine, patented by Messrs. W. H. Witham & Co., for recording time of attendance in large establishments. It consists of a box containing a small clock, a photographic apparatus, and a continuous slip of sensitised paper, which moves across a circular opening in the face of the box. Below this opening is a spring push rod. Each employee, on entering, stands for a moment in front of the box and pushes in the rod till a bell is heard to sound. By this action his face is instantaneously photographed on the strip, and by the same action the clock face is photographed beneath it, giving the time at which he entered. On the release of the spring rod the strip of paper moves forward automatically to be ready for the next comer. The strip or film is twelve feet long, and will take twenty-four photographs to the foot. The photographs have to be developed afterwards, which can be done at any time, and the film forms a record of the portraits and time attendances of each person. The special point of the invention is that it saves the charge for a timekeeper, every employee being his own timekeeper. The question is whether employees will always be satisfied that they are adequately identified by the photograph; we should think that difficulties may arise on this head. But the apparatus is certainly a very ingenious one.

"GLASOGRAPHY" TILES AND WINDOW GLASS.—We have recently had introduced to our notice an interesting method of transferring designs to glass wall tiles, decorative window glass, &c.; the process is known as glasography. The glass being cut to the required shape, the design is transferred to it by a modification of chromo-lithography. The different colours are printed on separate pieces of paper, and the transfer to the back of the glass is effected by reprinting from the papers. For the tiles the colour is protected by a coat of paint; but for the window glass transparent varnish is employed. The process is also to be adopted in the production of brilliant advertisement plates in glass. The advantage of printing on the back of the glass tiles instead of the front will be manifest, as protecting the design from being scratched, though it may be doubted whether a mere coating of paint is the best substance for protecting the back. The nature of the cementing material will have to be carefully considered, otherwise the colour will be liable to injury from within. We understand that the process of fixing, &c., is not yet definitely decided upon, and that experiments are being made in that direction. The invention is of German origin, and there seems no reason to doubt that when introduced to the English market, the goods will find a ready sale.



Russell & Cottrell's Road Scarifier.

RUSSELL & COTTRELL'S ROAD SCARIFIER.—This scarifier, illustrated in the accompanying drawing, is intended for attachment to a steam roller or traction engine. It is formed by bolting two iron plates to the body of the engine inside the driving wheels, which are united by a rectangularly bent plate behind the tender. These plates project in rear of the tender, and are, at their extremities, drilled to receive circular revolving bearings, which are in turn formed to carry a steel bar of square section. The square bar is fitted at one side of the engine with a lever, having, at its other extremity, a screw shaft with a hand-wheel. On the square bar are one or more tool carriers (secured by a pair of set screws), which carry the reversible tines which do the actual work of scarifying. To put the machine into action, the driver, by means of the hand-wheel, lowers the lever ; this causes the square bar to rotate with its bearings, and lowers the points of the tines till they engage with the surface to be broken up. By merely loosening the set screw, the tool carrier can be slipped off the bar, and replaced on the other side of the engine, thus enabling the whole surface of a road to be scarified, even on a severe gradient. The scarifier automatically puts itself out of work on reversing the engine. The special advantage claimed for it, however, is that it will scarify on either side or in the centre of the engine, and thus enables the whole width of a road to be scarified without turning the engine, which renders it particularly useful in hilly districts.

ELECTRIC LIGHTING, PAISLEY.—The current for the electric lighting of the burgh of Paisley was switched on on the 5th inst., in the new electricity works erected by the Paisley Corporation. The works are situate at Blackhall, off the Barrhead-road, and have been erected from plans prepared by Mr. Francis Teague, burgh electrical engineer, under whose arrangement the whole scheme has been carried out.

NOS. 26-7, COCKSPUR-STREET.—We are informed that Mr. Stanford has disposed of his premises in Cockspur-street to the London County Council for an extension of their office accommodation. The premises were erected for that business house (then of No. 55, Charing-cross) in 1888-9 by Messrs. Higgs & Hill, from the designs of Mr. T. Barnes-Williams. To clear the site, the "British Coffee House," designed about 1770 by Robert Adam, was pulled down, and, as we said at the time, it is to be regretted that so good a specimen of the school of the brothers Adam was destroyed. The front, 20 ft. wide, of four stories, rising to 40 ft., including the balustrade, was in red brick, beautifully jointed, with a vase in the niche on each side of the central window on the first floor ; in the centre of each floor was a large Palladian window, 10 ft. 6 in. wide, divided into three lights by columns half engaged, recessed between piers 5 ft. in width, with entrances in the piers on the ground floor.

AUSTRALIAN IRON-BARK TIMBER. — A correspondent in Sydney writes :—"Australian hardwood trees are remarkable for the great size of the beams which may be obtained from them, as well as for the extreme strength and durability of their wood, the grey iron-bark having a resistance to breaking equal to 17,900 lbs. per square inch, as compared with a mean of 11,800 lbs. for English oak, and 15,500 lbs. for teak. None of the other timbers of the colony have so high a resistance to breaking as this description of iron-bark ; but nearly all the varieties have a greater strength than oak. The absence of branches for the greater portion of the height enables the timber to be obtained to the best advantage ; and as full-grown trees of most varieties are rarely less than 100 ft. high, with corresponding girth, the quantity of timber obtainable is very large. It will readily be seen, therefore, that the timbers of the colony are in every way suitable for building construction, wood-blocking, jetties, railway carriages, and other work in which great strength and durability is required. It has been officially estimated that the area of iron-bark lands belonging to the Crown in New South Wales is 16,870,000 acres, on which there is sufficient timber ready for cutting to yield 167½ million sleepers, and that if private lands are also taken into account the number of iron-bark sleepers alone which the colony can produce may be set down at 500 millions, sufficient for no less than a quarter of a million miles of railway track. Under proper forestry regulations and conservation the production of grey iron-bark could be continued on a most extensive scale for many years to come."

STREET WORKS, BARRY.—Colonel A. C. Smith, R.E., Inspector to the Local Government Board, held a public inquiry at the Gas and Water Offices, Barry Dock, on the 8th inst., for the purpose of considering the Barry Urban District Council's proposals to borrow three sums of 1,480*l.*, 2,360*l.*, and 365*l.*, for private street works and the construction of a new road. The surveyor (Mr. J. C. Pardoe) explained that 1,480*l.* was required for private street works in Oxford-street, Cambridge-street, Kathleen-street, the lane rear of Jewel-street, and the lane rear of Dock View-road ; 2,360*l.* for private street works in Everard-street, Tydvil-street, Wynd-street, and the continuation of Rectory-road. The Inspector examined plans showing the portion of the Gladstone-road for which the Council required the sum of 365*l.*

BRISTOL CITY ENGINEER'S REPORT.—The annual report by the City Engineer of Bristol (Mr. T. H. Yabbicom) gives evidence of a great deal of energy and activity in carrying out public improvements. A great amount of work has been carried out in improvement to and repair of streets, cleansing and repair of sewers. Twenty-one and a half miles of electric-light cable have been laid down. During the year 875 plans for new buildings and alterations to old ones were submitted to the Sanitary Committee, of which number 629 were approved, and a new Council chamber has been erected on the vacant land in the rear of the Council house to provide the requisite accommodation for the Council, the numbers of which were increased from sixty-four to eighty-four on the extension of the Bristol City Boundaries. The report is very well drawn up and gives systematic details of work and expenditure.

CAPITAL AND LABOUR.

LABOUR AGITATION, IPSWICH.—For some time past the labourers in the building trade in Ipswich have been agitating for an advance in wages. The local branch of the Navvies', Bricklayers' Labourers', and General Labourers' Union made a demand to the master builders for ½d. per hour. The masters met a deputation from the Union, and, after discussing the matter, it was resolved to submit the question to arbitration. The builders chose as their arbitrators Mr. G. F. Josselyn and Mr. F. H. Fosdick, and the men Mr. D. F. Goddard, M.P., and Lord John Hervey. They met recently, and, after sitting from 11 a.m. till 5 p.m., gave their award as follows :—One farthing advance on and after September 29, and another farthing on and after March 25, 1900. An agreement was also come to that no further advance shall be asked for a period of three years. The rates of wages now paid are :—Scaffolders and timber-men, 5d. per hour ; labourers, 4½d. ; these will ultimately rise to 5½d. and 5d. The local branch of the Union numbers close on 500 members, and probably 800 or 900 workers will be affected by the increase.—*East Anglian Times.*

BRICKLAYERS' WAGES, BURTON-ON-TRENT.—About three months ago the Burton-on-Trent Operative Bricklayers' Society applied to the master builders of the town for an advance of wages from 8d. to 8½d. per hour, coupling with the application a request that a reply should be given early in September. The masters discussed the matter at several of their meetings, and have decided to grant the increase asked for on November 1, providing the men would consent to such an alteration of hours during the winter months as would obviate payment for time during which, owing to defective light, much work could not be done. The men's representatives, after considering the matter, expressed their willingness to agree to the suggested alteration on condition that the advance in wages commenced on September 11. The masters assented to this stipulation, and there is thus every possibility of a speedy and peaceful solution of the question.—*Birmingham Post.*

LEGAL.

ACTION BY THE POSTMASTER-GENERAL :

ALLEGED INTERFERENCE WITH ANCIENT LIGHTS.

COUNSEL applied to Mr. Justice Cozens-Hardy, sitting in the Vacation Court, on the 13th inst., for leave to serve notice of motion with the writ in an action brought by the Postmaster-General for alleged interference with ancient lights, on an application by the plaintiff for an interim injunction restraining such interference until the trial.

The application was granted, it being stated that the case would be put in the paper on the 20th inst.

ALLEGED WRONGFUL INTERFERENCE WITH A WALL.

THE case of Smith *v.* the York Union Banking Company, Limited, came before Mr. Justice Cozens-Hardy sitting as Vaction Judge on the 13th inst. on an application by the plaintiff for an interim injunction to restrain the defendant company until the trial from interfering with a certain wall.

Upon the case being called on counsel stated that the building complained of had been completed and with his lordship's sanction it had been arranged that the motion should stand till the trial.

His lordship assented.

DEBENTURE-HOLDERS AND A PAVEMENT COMPANY.

MR. JUSTICE COZENS-HARDY, sitting as Vacation Judge, on the 13th inst. appointed, by consent, a receiver and manager of the Improved Court Pavement Company, Limited, in a debenture-holder's action. His lordship directed that the gentleman appointed should not act beyond the end of the year.

MEETINGS.

FRIDAY, SEPTEMBER 15.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. John Castell-Evans on "Mechanical Physics." 8 p.m.

MONDAY, SEPTEMBER 18.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. John Castell-Evans on "Natural Forces." 8 p.m.

WEDNESDAY, SEPTEMBER 20.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. John Castell-Evans on "The Atmosphere." 8 p.m.

Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting of the members. 8 p.m.

FRIDAY, SEPTEMBER 22.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. John Castell-Evans on "Air and Ventilation." 8 p.m.

RECENT PATENTS :

ACCEPTED SPECIFICATIONS.

Open to Opposition until November 6.

[1898] 12,434 Burden, Gas or Oil Stoves. 18,419, Ziegner, Developing Power from Immersed Bodies. 18,848, Strathern, Weldless Chains, and Machinery for making them. 18,902, Hauschildt, Apparatus for Watering the Streets. 18,956, Pollak, Electrolytical Condensers and Electrical Current Directing Devices. 19,147, Nunn, Indiarubber Water-closet Cones. 19,246, Lamme, Systems of Electrical Distribution and Regulation. 19,264-5, Canté, Electrical Meters, and Coin-freed Mechanism for them. 19,273, Barraclough, Ball Taps or Valves for Cisterns, &c. 19,799, Parker, Grinding Apparatus for Use in Lathes. 19,986, Brown & Allen, "Recuperative Gas Lamps." 20,125, Shone & Ault, Pneumatical Lifting Apparatus for Water, Sewage, &c., and their Partial Purification. 20,360, Nienstaedt, Stocks and Dies. 20,451, Dymond, Gas Producers. 20,607, de Murat, Automatical Apparatus for Flushing Water-closets, Drain-pipes, &c. 20,629, Storey, Dust, Rain, and Draught Excluders. 21,231, Armour, Building Blocks and Bricks. 21,576, Barltrop, Acetylene Lamps. 21,655, Crawley, Resistance

Measurer. 21,796, Barns, Window-guard. 21,856, Noble & Allison, Device for Opening Locked Ventilation-doors in Mines without a Key in cases of emergency. 22,241, Tester, Suspended Roofs with Radiating Ribs. 22,389, Warner, Sewer Flap Siphon Trap. 22,674, Bush, Varnishing and Coating Continuous Paper and other Material. 22,710, Stanley & Fieldwick, Drawing-boards and T-squares. 22,725, Guest, Guages. 22,777, Feldmann, and 22,802, Steele, Maple, and Verity, Distributors or Reflectors for Electrical Incandescence and other Lamps. 22,826, Bailey & Clapham, Acetylene Generator. 22,845, Markham, Locking Catches for Window Fastening Bolts, &c. 22,858, Prestwich & Burt, Combined Apparatus for Regulating Supply of Electricity to Lamps, Motors, &c. 22,928, Linder, Arc Lamps. 23,103, Kennedy, Hydraulic Pumps. 23,265, Preston, Glow Lamps and Holders. 23,420, Steele, Maple, & Verity, Incandescence Electrical Lamps. 23,784, Röper, Registering Devices for Use with Lifting and Hoisting Apparatus. 24,475, Kreuzer, Method and Means of Splitting Stones. 25,523, Matthews, Varnish, Stain, Paint, and Similar Cans. 26,517, Sear, Well-doors for Lifts. [1899] 264, Doran, and 13,738, Bruckner, Incandescent Vapour Lamps. 3,276, Keszlers, Stoves. 4,671, Wingender, Chimney Provided with Air-suction Pipes for Dwelling-rooms. 6,665, Boeckh, Bridle for Brushes. 7,160, Wehner & Kandler, Production of Small Masses of Calcium Carbide. 9,474, Humberstone, Hot-water Boiler for Heating Baths, &c. 9,816, Stevens, Artificial Stone. 10,476, Houbois, Reflector and Shade Holders and Reflectors for Gas and Electrical Lamps. 11,010, Brandt, Water-proof Lamp Holder for Swan Incandescent Electrical Lamps. 12,027, Adams, Flushing Cisterns for Closets, &c. 12,635, Halsey, Electricity Meter. 13,006, Moll, Lathes. 13,434, Spalding & Thurston, Micrometer Calipers. 13,955, Hausmann & Ritter, Electrical Time Alarm Apparatus. 14,444, Fröhlich, Gas-Ignition. 14,721, Pasman, Flushing Apparatus. 15,460, Gardner, Tap Switch for Electrical Incandescence Lamps. 15,619, Ziegler, Combined Screw-down Valve and Ball Valve-cock for water Supply Pipes, &c.

ABSTRACTS OF PATENTED INVENTIONS.

10,719.—RATCHET BRACES: *H. Balluet.*—The brace's pillar support is clamped upon the work by means of adjustable jaws tightened with a screw, and passes through a second hole in another jaw which holds it at a right-angle, its foot being provided with bolting-down lugs and claws for catching under chains, props, and so on. In a double socket, vertically adjustable on the pillar, is a rod, and into a boss on the rod screws a feed-sleeve (turned by handles) wherein the drill-spindle is carried. A cranked lever, or an ordinary ratchet gear, drives the spindle, between which and the sleeve is placed a ball race, to allow the use of drills with either pointed or recessed centres; a double cone-piece having pointed and hollowed centres can be reversed in the socket.

10,734.—GULLY TRAPS: *J. E. Place.*—A side branch is attached to the inlet of the gulley trap, and it is turned so as to lead into the ventilating box, or the opening, which is let into the side of the wall.

10,746.—HYDRAULIC VALVES; GAS-MAKING: *H. Simon.* In order to facilitate the cleaning of the valve's seal chamber, it is so fixed that it may communicate at the bottom with an annular trough which either has cleaning doors or is open at its top: two or more separate troughs may be employed.

10,750.—DUST BINS: *J. A. Brodie.*—For a bin that is fixed, for instance, in an opening in the wall of a yard, to be removed when it is to be emptied, from without, the back, being higher than the front, falls behind a flange when the bin is in its place, and the upper edge rests against a rib that projects from the frame's top, as the bin is removed it is tilted by means of pins on its sides, that engage in slots in the frame's sides, the bin has a handle and handle holes, and the pins may be made to revolve for use as locking devices.

10,763.—CALCIUM CARBIDE: *J. Sartig.*—With the carbide is mixed from three to six per cent. of lycopodium, talc, or other similar substance, whereon the water or the gas in an acetylene generator will have no effect, whereby the carbide will easily slip or slide when it is being charged into the generator.

10,768.—WORKING OF STONE: *J. G. Faulds.*—The invention consists of a device for making a groove in the holders, carried in the tumbling sockets of stone-planing machines, and fitting removable bits, having toothed or plane edges, in the groove.

10,775.—CLEANSING FILTERS HAVING A LARGE CAPACITY: *H. A. Desrumaux.*—The water which is to be filtered passes through a pipe which has a cock and a float-controlled valve, down another pipe (within the filter's upper part) at the bottom whereof is a plate which distributes the water evenly over the bed of granulated flint, the water passes thence to an outlet through a cone-shaped baffle-plate which retains flint particles, and in so doing produces an even distribution of the water; when the filter is to be cleansed, unfiltered water above the flint bed is drawn off through a side pipe, the appropriate cocks are closed and opened respectively, and the stirring wheel is set in motion; the formation of fresh filtering surface is quickened by the deposit of a certain amount of the liquid containing organical matter, owing to the inlet of the drawing-off pipe being situated at some height above the surface of the filter-bed.

10,807.—FACING-TILES, DAYLIGHT REFLECTORS, AND SLABS: *J. T. Newell & A. Miller.*—A hot mixture of pitch and gas tar is laid on the back surface of glass plates or sheets, and with the coating is incorporated granular clinker or coke breeze by exposing the plates, with their faces downwards to a top heat in a furnace. To the rough surfaces is applied a backing of cement which can be impressed with a device, or be scored or moulded to receive plaster when the plate is to be affixed to a wall.

10,846.—PAPER HANGINGS: *J. E. Farrow.*—As the paper leaves the printing machine its unprinted edges are cut away by sharpened overlapping cutting-dises mounted in adjustable brackets and driven by toothed gearing, the paper being guided through the cutters by means of ollers.

10,854.—SPIGOT AND SOCKET PIPE JOINTS: *A. L. Lloyd.*—The object of the invention is to dispense with the lessening of the bore at the joint of steel water-pipes; the spigot end is enlarged, so that the round of rivets does not project within the pipe's normal bore, whilst the socket end is enlarged that it may fit over, and be rivetted to, the spigot end, the channel around the rivet heads can be filled with cement, in order to make a uniform bore; thickened-ended pipes may be employed so that the thickness of their enlarged ends will equal that of the pipe itself, and the enlarged ends of the pipes may be made by the ordinary process of bell-mouthing or by rolling.

10,868.—MAKING SOCKETS ON METAL PIPES OR TUBES.—*R. Chillingworth.*—After a rounded protuberance with a hole at its apex has been made upon the wall of the tube (see No. 8,050 of 1895) the tube is enclosed within a casing, a hard steel ball, resting upon a plug, is forcibly pressed against the projection so as to stretch it out and form a tubular socket by means of the plunger. If a socket is needed which shall be larger than one half the ball's diameter, a wedge is inserted between the plunger and the ball.

10,870.—ROLLERS FOR WINDOW BLINDS, &c.: *R. F. Shillingford.*—In the hem of the blind, curtain, ambulance cloth, &c., is inserted a solid roller and then end caps, provided with a pivot, a cord-groove and a slit are attached, the cloth enters into the slit and thus can extend over the roller's entire width; in another form the blind is held between two or more rods, which together constitute the roller, the rods being forced apart and fastened on to the caps by means of a wedge on the end caps which is forced between the rods.

10,910.—BALL AND FLOAT VALVES: *E. Hope.*—A valve for regulating the flow of water into a cistern is placed within the casing, which has a water inlet and outlet, and the valve is attached to the short arm of a float lever, which is pivotted to lugs that project from the casing; the water in the supply pipe presses the valve against its seat when the valve is closed.

10,965.—ELECTRICAL SWITCHES: *A. V. Giskins & F. R. Hill (Hill, Giskins, & Co.).*—The movable contact, consisting of a series of plates is put into a carrier, which has a handle and spring, giving a quick break, through spring distance-pieces set between the plates is passed a screw that engages a nut; since the plates move lengthwise slightly upon the screw, each of them can be separately adjusted between the fixed contacts, and their number can be proportionate to the current.

10,985.—ACETYLENE LAMPS: *J. Bilbie & H. Drivet.*—The carbide chamber is placed within the water chamber and secured centrically therein by means of side springs. A perforated tube, which extends into the water space beneath the carbide chamber, contains an endless wick that supplies water to the carbide. The carbide chamber can be lifted out of the water, and the two chambers have removable lids.

11,008.—LATHING: *P. Strauss.*—The lathing consists of wire netting, which is embedded in clay by the operation of rollers that have recesses in order that they may make spaces for the plaster. The clay network is dried by being passed slowly over a heated body, and is then slowly passed through horizontal slits in the opposite walls of a furnace; it can be rolled up, and is described as being suitable for fireproof walls, ceilings, &c.

11,013.—ATTACHMENT OF DOOR KNOBS, &c.: *F. H. Collins.*—The invention lies in providing a ball-bearing between the neck of the knob and the rose of mortise and rim locks. A groove cut in the rose and a corresponding groove cut in the neck of the knob serve as a race for the balls which are inserted on the removal of the screwed plate.

11,166.—DRAIN TESTING: *T. Kemp.*—The tube which carries the chemical preparation has open ends across which are stretched india-rubber strips kept in their place with a coiled string. The tube is then wrapped in a paper strip fastened with a tab, which the string tears open when the tester is washed into the drain, whereby the odour-producing chemical is liberated, caps retained in position by the rubber strip may be fitted on to the tube.

PRICES CURRENT OF MATERIALS:

WOOD.*

Per Petersburg standard hundred.

	£	s.	d.	£	s.	d.
White Sea: first yellow deals	17	5	0	18	5	0
Second do.	13	10	0	15	0	0
Third do.	11	15	0	13	0	0
Battens, 4os., 3os., and 15s. less respectively.						
Petersburg: first yellow deals	14	0	0	16	10	0
Second do.	11	0	0	12	10	0
Battens, 3os. and 2os. less respectively.						
Petersburg, white deals	10	0	0	12	0	0
Do. white battens	8	15	0	10	5	0
Riga, white deals	8	10	0	9	10	0
Swedish mixed yellow deals	13	10	0	17	0	0
Third do.	12	10	0	15	0	0
Fourth do.	11	0	0	12	0	0
Fifth do.	10	0	0	11	0	0
Battens, 3os., 2os., and 1os. less respectively.						
Whitewood, 10 to 20 per cent. less.						
Finnish unsorted yellow deals	10	0	0	10	10	0
Battens, 1os. and 5s. less respectively.						
Whitewood, 5 to 10 per cent. less.						
Norwegian second yellow battens	7	10	0	8	0	0
Third do.	7	0	0	7	10	0
Fourth do.	6	10	0	7	0	0
Whitewood, 1os. less.						
Danzig, Crown Deck deals, per 40 ft. 3 in.	0	15	0	1	5	0
Brack	0	12	0	1	0	0
St. Lawrence Pine deals, &c., per P.S.H.:—						
1st, Bright and Dry, regular sizes	20	15	0	27	5	0
,, ,, oddments	13	15	0	20	10	0
2nd ,, regular sizes	15	15	0	19	0	0
,, ,, oddments	11	5	0	14	15	0
3rd ,, regular sizes	9	15	0	11	5	0
,, ,, oddments	8	5	0	9	5	0
4th ,, regular sizes	8	0	0	8	15	0
,, ,, oddments	7	5	0	8	0	0
St. Lawrence Spruce deals, &c.						
First, regular sizes	9	0	0	11	0	0
Second ,,	7	15	0	8	15	0
Third ,,	7	10	0	8	5	0
Fourth ,,	6	10	0	7	5	0
Oddments and battens at 2os., 1os., 7s. 6d., and 5s. less respectively.						
New Brunswick Spruce deals, &c.	7	10	0	8	5	0
Oddments, battens, and fourths	6	15	0	7	15	0

* The prices named are for the wood as imported and landed in the docks. Ten per cent., approximately, should be added in order to arrive at the current trade prices.

PRICES CURRENT—*continued.*

	£	s.	d.	£	s.	d.
United States pitch pine planks and boards	8	15	0	12	5	0
Prepared Boards, per square						
1½ by 6½ and 7 in. 1st yellow		11	0		15	6
,, ,, 2nd ,,		7	0		11	3
1 by 6½ and 7 in. 1st ,,		10	3		11	9
,, ,, ,, white		8	0		10	3
,, ,, 2nd yellow		8	0		10	3
,, ,, ,, white		6	3		8	0
¾ by 6½ & 7 in. 1st & 2nd yellow		7	9		8	9
,, ,, ,, white		7	0		8	3
¾ by 6½ and 7 in. 1st yellow and white (grooved, tongued, and beaded)		7	9		8	6
¾ by 6½ and 7 in. 2nd yellow and white (ditto)		7	3		8	0
⅝ by 6½ and 7 in. 1st yellow and white (ditto)		5	9		6	9
⅝ by 6½ and 7 in. 2nd yellow and white (ditto)		4	9		5	9
Narrower widths at 10 per cent. less. 3rd quality at 15 per cent. less than 2nd.						
Danzig and Memel Fir Timber— per load						
Best middling	3	0	0	3	5	0
Good middling and Second	2	10	0	3	0	0
Common middling	2	5	0	2	10	0
Undersized	2	5	0	2	15	0
Swedish and Norwegian Balks	2	5	0	2	10	0
Baltic Oak Timber—						
Danzig and Stettin—Large	3	0	0	3	10	0
Small	1	15	0	2	0	0
Quebec Timber per load						
Yellow Pine	5	0	0	6	15	0
Oak	4	2	6	6	0	0
Elm	4	12	6	5	5	0
Ash	3	15	0	4	15	0
Birch	2	12	6	4	10	0
New Brunswick, &c., Birch	1	10	0	2	2	6
American Pitch Pine Timber	3	7	6	3	17	0
Wainscot, per log, 18 cubic ft.—						
Crown (Eng. & Dutch) nominal	3	17	6	5	10	0
Brack nominal	3	2	6	4	2	6
Lathwood, per cubic fathom—						
Petersburg	4	0	0	6	10	0
Riga and Danzig	4	10	0	5	10	0
Norway Poles, per ft. run	0	0	1	0	0	1½
Oak Staves, per mille full size pipe						
Memel, Crown	210	0	0	220	0	0
Brack	180	0	0	190	0	0
Danzig	165	0	0	175	0	0
Bosnia, single Barrel (nominal)	98	0	0	30	0	0
United States, Pipe	35	0	0	42	10	0
Hogshead, extra heavy and double extra	27	10	0	32	10	0
Indian Teake per load	11	10	0	16	10	0
British Guiana Greenheart	0	0	0	8	0	0
Mahogany, per foot superficial—						
Honduras, cargo average	0	0	4½	0	0	6
Nicaragua, do.	0	0	4½	0	0	5½
Tabasco, do.	0	0	4	0	0	6½
Mexican, do.	0	0	3½	0	0	4
Panama, do.	0	0	3	0	0	4
African, do.	0	0	3½	0	0	5
Cuba, do.	0	0	5½	0	0	7½
St. Domingo, do.	0	0	5	0	0	7
Do. Curls (good to prime)	0	0	9	0	1	3
Walnut, American (logs)	0	2	3	0	4	6
Do. do. (planks and boards)	0	2	0	0	7	6
Italian, per foot superficial	0	0	3	0	0	7½
Black Sea, per ton	6	0	0	12	0	0
Satin Walnut (logs) per foot cube	0	1	0	0	1	3
,, (planks and boards)	0	2	0	0	2	9
Sequoia (Californian redwood), per foot cube	0	1	9	0	2	0
Whitewood, American (logs)	0	1	3	0	1	6
,, ,, (planks and boards)	0	1	6	0	2	9
Quartered oak ,, ,, ,,	0	2	3	0	4	0
Kauri pine (logs)	0	1	9	0	2	0
,, ,, (planks)	0	2	3	0	2	9
Jarrah (planks)	0	2	3	0	2	6
Lancewood spars each, fresh and large	0	5	0	0	8	0
Lancewood spars, ordinary to fair	0	4	0	0	5	0
Degame spars	0	8	0	0	10	6

METALS.

IRON—Pig, in Scotland ton	3	9	6	0	0	0
Bar, Welsh, in London	6	0	0	6	5	0
Do. do. at works in Wales	5	15	0	5	17	6
Do. Staffordshire, in London	6	5	0	7	10	0
COPPER—British cake and ingot	81	0	0	81	10	0
Best selected	81	10	0	82	0	0
Sheets, strong	86	0	0	88	0	0
Chili bars	76	16	3	0	0	0
YELLOW METAL lb.		6¾d.			7¼d.	
LEAD—Pig						
Spanish ton	15	5	0	0	0	0
English Com. Brands	15	10	0	0	0	0
Sheet, English, 6 lbs. per sq. ft. and upwards	16	10	0	0	0	0
Pipe	17	0	0	0	0	0
ZINC—English sheet ton	27	0	0	0	0	0
Vieille Montagne	28	0	0	0	0	0
Spelter	23	10	0	24	0	0
TIN—Straits	147	5	0	0	0	0
Australian	147	5	0	147	10	0
English Ingots	149	0	0	150	0	0
Banca	0	0	0	0	0	0
Billiton	0	0	0	0	0	0

OILS.

Linseed ton	21	7	6	0	0	0
Cocoanut, Cochin	29	5	0	0	0	0
Do. Ceylon	25	15	0	0	0	0
Palm, Lagos	24	0	0	0	0	0
Rapeseed, English, pale	24	15	0	0	0	0
Do. Brown	23	5	0	0	0	0
Cottonseed ref.	17	15	0	18	15	0
Oleine	17	5	0	19	0	0
Lubricating U.S.	0	5	9	0	7	9
Do. Black	0	5	0	0	6	0
TAR—Stockholm barrel	1	6	6	0	0	0
Archangel	1	0	0	0	0	0
Turpentine	34	2	6	0	0	0

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
Designs in Tunbridge Ware	Tunbridge Wells Tech Education Com.	3 gns.; 2 gns.; 1 guinea	Sept. 30
New Public Market	Bd. of Public Wks. for Island of New Providence, Bahamas, West Indies	40l. 10l. 5l.	Nov. 30

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c. Supplied by	Tenders to be delivered.
Sewering, Levelling, &c. Upper Newborough-st. and others	York Corp.	A. Creer, Engr. Guildhall, York	Sept. 18
Additions to School, Tyersal	Bradford Sch. Bd.	E. P. Peterson, Archt. 48, Sunbridge-rd. Bradford	do.
Ten Dwellings, Durnsford-rd.	Wimbledon U.D.C.	C. H. Cooper, C.E. Broadway, Wimbledon	do.
Supplying Granite Kerb and Setts	Edmonton U.D.C.	G. Eedes Eachus, Town Hall, Lower Edmonton, N.	do.
Additions to Schools	Gwennap (Cornwall) Sch. Bd.	S. Hill, Archt. Redruth	do.
Steel Roofing	Middlesbrough Corp.	D. Terrace, Gasworks, Middlesbrough	do.
C.I. Pipes	Lancaster Corp.	J. Cook, C.E. Town Hall	do.
Making-up John-st. Blackheath	Rowley Regis U.D.C.	D. Wright, Council Offices, Old Hill	do.
Additions to Bank Premises, Skipton	Craven Bank	J. Varley & Son, Engrs. Skipton	do.
Sanitary Work, &c. Park-terrace, Pontypool	Trevethin Sch. Bd.	H. Bythway, Sch. Board Offices, Pontypool	do.
Abattoir, Cattle Market	Preston Corp.	Boro. Surv. Town Hall	do.
Two Blocks of Houses, Craigellachie, N.B.	———	Reid & Wittet, Archt. Elgin	do.
New Coastguard Buildings at Littlestones in Kent	———	Director of Works Dept. Admiralty, 21, Northumberland-av. W.C.	Sept. 19
Police Station, Didsbury, Lancs.	Standing Joint Com	H. Littler, Archt. County Offices, Preston	do.
Movable Floor, &c. Swimming Bath, Cockridge-st.	Leeds Corp.	City Engr. Municipal Buildings, Leeds	do.
Waterworks	Witney U.D.C.	N. Lalley, C.E. 16, Great George-st. S.W.	do.
Boundary Walls, &c. Caldewgate School	Carlisle Sch. Bd.	E. Higginson, Archt. 3, Lonsdale-st. Carlisle	do.
Paving Works, Seymour-street, &c.	Tynemouth Corp.	J. F. Smillie, Boro Surv. Town Hall	do.
Business Premises, Tow Law	Industrial & Provident Society	Secretary, Tow Law, near Newcastle	do.
Forming, Draining, &c. Llantwit Fardre	Llantrisant R.D.C.	Griffith & Morgan, Surv. Porth House, Porth	do.
House, Stabling, &c. Wigton-road, Carlisle	W. Wood	J. Leslie, Archt. 71, Broad-st. Carlisle	do.
Boundary Walls, &c.	Coventry Hospital Committee	J. E. Swindlehurst, C.E. Coventry	do.
Drainage Works	Swinton U.D.C.	R. Fowler, C.E. Council Offices	do.
Strong Room, &c. Long Melford, Suffolk	———	Fisher & Steed, Long Melford	Sept. 20
House and Shop, Silloth, Cumberland	D. Over	G. Armstrong, Archt. 24, Bank-st. Carlisle	do.
Alterations to Paths, Leaf-street	Manchester Corp	City Surv. Town Hall	do.
Filter Beds, Pembury	Tunbridge Wells Corp	W. C. Cripps, Town Hall	do.
Reservoir, Crosbie Dykes	West Kilbride Water Com.	Warren & Stuart, C.E. 115, Wellington-st. Glasgow	do.
Fire Appliances at Workhouse and Schools Leytonstone, Essex	West Ham Union	Dunford, 100c, Queen Victoria-st. E.C.	do.
Construction of Filter Beds and Waterworks, Pembury	Borough of Tunbridge Wells	Borough Surv. Town Hall, Tunbridge Wells	do.
Embankment Works, &c. Skibo, Sutherland	———	Mr. Manners, C.E. 12, Lombard-st. Inverness	do.
Sewer Pipes, Shettleston	Lanark C.C	Warren & Stuart, 115, Wellington-st. Glasgow	do.
Cast Iron Pipes and Laying (2½ miles)	West Kilbride (N.B.) Water Works	do.	do.
Sinking Three Shafts, South Edges Rastrick, Leeds	———	Bentley & Smith, Quarry Owners, Brighouse	do.
Reconstruction of Bridge, Pound Bars	Belfast Corp.	City Surv. Town Hall	do.
Boundary Wall, &c. Ballinaboy, Ireland	Kinsale R.D.C.	R. Evans, C.E. 53, South Mall, Cork	Sept. 21
Three Cottages, Cloughglass, Londonderry	R. Corscaden	B. E. Buchanan, Archt. Londonderry	do.
Iron and Steel Work Bridge, Aireworth	Keighley Corp.	W. H. Hopkinson, C.E. Boro Engr. Town Hall	do.
Street Works, King-street, &c.	Hoyland U.D.C.	W. Farrington, C.E. Town Hall	do.
Enlarging Council Chamber, &c.	Cambridge T.C.	Borough Engr. Guildhall, Cambridge	do.
Additions to School, Cwmclydach	Ystradyfodwg Sch. Bd.	J. Rees, Hillside Cottage, Pentre	do.
*Workhouse, Llwynpia	Pontypridd Union	E.C. Spickett, Union Offices, Pontypridd	Sept. 23
Additions to House, Wickeridge, Ashburton	G. E. Allen	Mr. Barrons, Weir View, Totnes	do.
Underground Convenience, Egremont, Cheshire	Wallasey U.D.C.	W. H. Travers, Engr. Public Offices, Egremont	do.
Building Works at Workhouse	Cerne Abbas Union	A. E. A. Cole, Union Offices, Cerne Abbas, Dorset	Sept. 25
Schools, Clones, Ireland	———	T. Elliott, Archt 37, Darling-st. Enniskillen	do.
Reconstructing Bridge, Wisley	Guildford R.D.C.	N. Lalley, C.E. 16, Great George-st. S.W.	do.
Old Granite Pitching	Vestry of St. Marylebone	The Court House, Marylebone-lane, W.	do.
Girder Bridge, Weston, Pembridge	Kington (Hereford) R.D.C.	F. Extcn, Surv. Council Offices	do.
Schools, Clones, Ireland	———	T. Elliott, Archt. 37, Darling-street, Enniskillen	do.
Repairs, &c. at Church, Ballyshannon, Ireland	———	T. Elliott, Archt. 37, Darling-street, Enniskillen	do.
School, Westoe-road	South Shields Sch. Bd.	F. Rennoldson, Archt. 37, King-st. South Shields	Sept. 26
Stone, Road Metal, &c. (2,500 tons)	Erdington U.D.C.	H. B. Humphries, Engr. Public Hall	do.
Erection of New Out Office at Gamuel-road Schools	Walthamstow Sch. Bd.	W. A. Longmore, Bridge Chmbrs. Hoe-st. Walthamstow	do.

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c. Supplied by	Tenders to be delivered.
Paving Works, Morley-avenue, Bill Quay, &c.	Felling U.D.C.	H. Miller, C.E. Council Offices	Sept. 26
*Supply and Delivery of Portland Cement	Edmonton U.D.C.	G. Eedes Eachus, Town Hall, Edmonton	do.
*Supply of Broken Granite	do.	do.	do.
Structural Alterations, Woodfield House	Paddington Gdns.	F. J. Smith, Parliament-Mansions, Victoria-st. S.W.	Sept. 27
School, Stanwell-road	Staines Sch. Bd	Murray & Dibdin, Archt. 5, Hurstbourne-rd. Forest-Hill, S.E.	Sept. 28
Villa Residence, Longtown	———	G. Armstrong, Archt. 24, Bank-st. Carlisle	do.
Three Houses, Chopwell, co. Durham	R. Armstrong	Bedenoch & Bruce, Archt. 55, Pilgrim-st. Newcastle	do.
Renovations, &c. at Police Station	Standing Joint Committee	A. Dryland, County Surv. Hereford	Sept. 29
Coastguard Buildings, Margate	Admiralty	Director, 21, Northumberland-avenue, W.C.	do.
*New Road, Wood Green	———	Vigers & Co. 4, Frederick's-place, Old Jewry, E.C.	do.
Cottage Hospital, Hallwill, Devon	———	C. F. A. Voysey, Archt. 6, Carlton-hill, N.W.	Sept. 30
Stoneware Pipe Sewers, &c.	Bakewell R.D.C.	Sterling & Swann, Engrs. Chapel-en-le-Frith	do.
Billiard Rooms, &c. Victoria Institute, Arundel	———	Wheeler & Lodge, Archt. Horsham	do.
Stabling, Workshops, &c.	Handsworth (Staffs) U.D.C.	E. Kenworthy, C.E. Council House	Oct. 2
Widening Rookery-road	do.	do.	do.
Widening, &c. Surly Hall-road, Clewer Without	Windsor R.D.C.	W. Menzies, Englefield Green, Surrey	do.
*Supply of Broken Granite	Hanwell U.D.C.	Council Offices, Hanwell, W	do.
Stabling, &c. Rock-a-Nore	Hastings Corp.	P. H. Palmer, C.E. Town Hall	do.
Nine Houses, Sowerby Bridge, Yorks	———	M. Hall, Archt. 29, Northgate, Halifax	do.
Fifteen Cottages, Flaxfield-road, Basingstoke	———	G. Fitton, Boro. Surv. Town Hall, Basingstoke	Oct. 3
Underground Urinal, Blackheath	L.C.C.	Archt's Dept. Spring-gardens, S.W.	do.
*Extension of County Hall, Lewes	East Sussex C.C.	F. J. Wood, Cty. Surv. County Hall, Lewes	do.
*Making-up Mill Hill-grove and Cheltenham-place	U.D.C. of Acton	Office, 242, High-st. Acton	do.
Railway, Blackpool South Shore, Kirkham	L. & Y. and L. & N. W. Joint Railways	R. C. Irwin, Hunt's Bank, Manchester	do.
Widening Railway, Blackpool	do.	do.	do.
*Supplying and Erecting Oak Cleft Fence at Forest House, Leytonstone	West Ham Union	Clerk, Office, Union-road, Leytonstone, E.	Oct. 4
*Electric Generating Station and Works	Parish of St. Mary, Battersea	Municipal-bldgs. Lavender Hill, S.W.	do.
Septic Tanks and Filter Beds	West Bridgford (Notts) U.D.C.	W. Pare, George-rd. West Bridgford	Oct. 6
Waterworks	Londonderry T.C.	J. S. Barnhill, C.E. 1A, Strand, Derry	Oct. 10
*Alterations to Wapping Swing Bridge, Wapping	L.C.C.	Engrs. Dept. County Hall, Spring Gardens, S.W.	do.
*Post Office Savings Bank, West Kensington	Comrs. of H.M. Works & Public Buildings	Tanner, H.M. Office of Works, Storey's Gate, S.W.	do.
Constructional Steelworks, &c.	Glasgow Corp.	J. Young, 88, Renfield-st. Glasgow	do.
*Erection of Asylum at Tooting Bec Common	Metropolitan Asylums Board	A. & C. Harston, 15, Leadenhall-street, E.C.	Oct. 11
Erection of Workhouse Infirmary, &c.	Wolverhampton Union	A. Marshall, King-street, Nottingham	Oct. 12
*Extension of Workhouse	Swansea Union	G. Baker Haynes, 8, Fisher-st. Swansea	Oct. 25
Paving Works, Grey Friar's Churchyard, &c.	Edinburgh Office of Works	Superintendent, City Chambers, Edinburgh	No date
Factory, St. James' End, Northampton	A. E. Marlow	Mosley & Anderson, Archt. Northampton	do.
Vicarage, Irthington	———	T. T. Scott, Archt. Carlisle	do.
Stabling, Factory, &c. Mountjoy-rd Newport, Mon.	———	Watkins & Brown, Archt. 156, Dock-st. Newport, Mon.	do.
Stores and Shops, Haymarket-lane, Newcastle-on-Tyne	W. Slater & Co. Ltd.	A. Stockwell, Archt. 11, Pilgrim-st. Newcastle-on-Tyne	do.
One Hundred Cottages, Coxlodge, Gosforth	———	J. H. Reah, Watergate-bldgs. Quayside, Newcastle-on-Tyne	do.
Whinstone, Bricks, &c.	———	J. Young, 86, Renfield-st. Glasgow	do.
Boundary Walls, Harehills House, Harehills-lane, Leeds	S. J. Stott	J. W. Thackray, Archt. 14 Infirmary-st. Leeds	do.
Thirteen Houses, Ivy House Estate, York-road, Leeds	W. Byrom	do.	do.
Villa Residence, Benton, nr. Newcastle-on-Tyne	———	J. W. Dyson, Archt. 67, Grey-st. Newcastle	do.
Villa, Benton, Northumberland	———	do.	do.
Residence, Burgate, nr. Fordingbridge	———	F. Bath, Archt. Salisbury	do.
Alterations to Grammar School, Cartmel	———	Settle & Farmer, Archt. Ulverston	do.
Additions, &c. to Banavie Hotel Banavie, N.B.	———	Cameron & Burnett, Archt. Academy Buildings, Inverness	do.
New Hotel, Cockbrook, Ashton-under-Lyne	———	T. D. Lindley, Archt. Market-av. Ashton	do.
Business Premises, Stamford-st. &c. Ashton-under-Lyne	G. Harrison & Sons	do.	do.
House and Shop, North-st. Keighley	———	Judson & Moore, Archt. York-chmbrs Keighley	do.
Nine Houses, Burnside-rd. Kendal	———	J. Hutton, Archt. Kendal	do.
Rebuilding Bridge, Kintbury, Berks.	Hungerford R.D.C.	C. Calvert, Surv. Council Offices, Hungerford	do.
Additions to Residence, Menston, Yorks.	———	Empsall & Clarkson, Archt. 7, Exchange, Bradford	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in.
*Superintendent of Roads	Vestry of St. John, Hampstead	2l. 2s. per week	Sept. 21

Those marked with an asterisk (*) are advertised in this Number. *Competitions, p. —.* *Contracts, pp.* iv. vi. viii. x. & xxi. *Public Appointments, pp.* xviii. xix. & xxi.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

August 26.—By PROTHEROE & MORRIS (on the estate).

Newquay, Cornwall.—The East Pentire Estate, 33 plots of building land, f. £3,606

By LLOYD & THOMAS (at Carmarthen).

Mydrim, &c., Carmarthen.—Close of grazing land, 11 a. 3 r. 23 p., f. 700

Six freehold houses and piece of garden ground £420

August 29.—By W. DEW & SON (at Llanrwst).

Llandrillo-yn-Rhos, Denbigh.—Tyn Llwyn Farm, 177 a. 3 r. 24 p., f. 2,700

Ffridd Wen Farm, 38 a. 3 r. 20 p., f. 800

Llansantffraid-Glan-Conway, Carnarvon.—Bryn Seller Farm, 74 a. 0 r. 19 p., f. 1,060

Freehold farm buildings, old slate quarry, and 12 a. 1 r. 24 p., f. 420

Llanrwst, Denbigh.—Station-rd., Glanafon House, f. £730

67 to 81 (odd), Denbigh-st., f. 335

Aelwyd Uchaf House, and 12 a. 3 r. 13 p., f. 305

August 30.—By JAMES HARRIS & SONS (at Petersfield).

Froxfield, Hants.—Claypit's Farm, 149 a. 3 r. 4 p., c. and f. 2,300

Ragmore Farm, 90 a. 3 r. 19 p., f. and c. 1,050

Prior's Dean, Hants.—Church and Baker's Farms, 155 a. 0 r. 31 p., f. 1,250

August 31.—By W. BROWN & Co. (at Great Missenden).

Prestwood Common, Bucks.—Wycombe-rd., &c., 16 plots of land, f. £442

By R. MARSH & SON (at Newcastle).

Longbenton, Northumberland. — Forest Lodge, with stabling, f. 1,500
Killingworth East Farm, 72a. 3r. 18p., f. 4,300
A moiety of a piece of land, 1a. 2r. 7p., f. 210
Ivy-st., two freehold houses, r. 26*l.* 12s. 270

By W. DEW & SON (at Llangefni).

Llanfairmathafarneithaf, Anglesea. — Ynys Coch Farm, 11a. 2r. 12p., f. 450
Llandyfrydog, Anglesea.—Tros-yr-Ardds Holding, 16a. 2r. 6p., f. 360
Gadfa Fawr Holding, 18a. 2r. 19p., f. 610
Porth Gadfa Farm, 35a. 0r. 17p., f. 1,000
Lodge, cottage, and smithy, f. 100
Ynys Felan Fawr Farm, 25a. 0r. 30p., f. 850
Deri Fawr Farm, 114a. 0r. 16p., f. 3,550
Llaneilian, Anglesea.—Maes-y-Groes Holding, and 5a. 3r. 5p., f. 265
Ty Canol Farm, 87a. 2r. 19p., f. 2,220
Penrallt House, 3a. 2r. 28p., f. 125
Gors Eilien Holding, 3a. 0r. 6p., f. 150
Amlwch, Anglesea.—Llain Groes, and 1a. 2r. 18p., f. 120
Llambadrig, Anglesea.—Clegyrog Canol Farm, 143a. 2r. 16p., f. 3,800

September 2.—By DILLEY & SON (at Huntingdon).

Alconbury Hill, Hunts.—The Hill Farm, 96a. 1r. 5p., f. and c. 2,950

By WILLSON & PHILLIPS (at Rayleigh).

Thundersley, Essex.—The Coombe Wood Estate, 48a. 2r. 3p., f. 2,000

September 4.—By FRED. VARLEY.

Finsbury Pk.—103, Blackstock-rd., u.t. 68 yrs., g.r. 6*l.* 6s., e.r. 38*l.* 300

By HY. HOOPER.

Lee.—27, Leyland's-rd., u.t. 65 yrs., g.r. 4*l.*, r. 52*l.* 10s. 500

September 5.—By OSBORN & MERCER (in conjunction with G. DURRANT & SONS).

Beccles, &c., Suffolk.—The Worlingham Hall Estate, 2,831 a. 1 r. 37 p., f., with the Manors of Ellough with the Soke and Wadehall (including timber, 10,800*l.*) 44,300

By W. MARTIN & Co.

East Dulwich.—15, Derwent-grove, u.t. 73 yrs., g.r. 5*l.*, r. 32*l.* 305
Peckham Rye.—8 and 12, The Gardens, u.t. 77 yrs., g.r. 14*l.*, r. 74*l.* 730

By ROBERT DALTON & SON (at Carlisle).

Penton, Cumberland.—Penton House, with the "Penton Bridge Inn," and 147 a. 2 r. 31 p., f. 5,000

By SLEE & SONS (at Bideford).

Sutcombe, Devon.—South Lane and Stone Farm, 200 a. 0 r. 37 p., f. 2,500

September 6.—By CHAS. VARLEY.

Finsbury Pk.—305, Seven Sisters-rd., u.t. 73 yrs., g.r. 12*l.* 12s., e.r. 120*l.* 1,300

By A. DOWELL (at Edinburgh).

Broughton, &c., Peebleshire.—The Estate of Kilbucho Mains, 900 acres 9,800

By W. F. FOX (at Mirfield).

Mirfield, Yorks.—Chadwickfold-rd., three freehold cottages, area, 1,740 yards 325
Huddersfield-rd., four freehold building sites, area 8,764 yards 777
The Nab, Nab's Cottages, with nursery ground, &c., area 2 a., f. 300
Ravensthorpe, Yorks. — Huddersfield-rd., two closes of land, 4 a. 3 r., f. 630
Mirfield, &c., Yorks.—The Wood End and Victoria Malt Kilns, three cottages, and 8 a. 3 r. 20 p., f. 3,100

By HUMBERT & FLINT (at Folkestone).

Folkestone, Kent.—5 and 6, Langhorne Gardens, u.t. 63 yrs., g.r. 24*l.*, r. 250*l.* 3,415

September 7.—By G. B. HILLIARD & SON.

Ingatestone, Essex.—Stonedene, u.t. 95 yrs., g.r. 8*l.* 1,150

By C. C. & T. MOORE.

Limehouse.—41 and 43, Elsa-st., f. 335
10, Locksley-st., u.t. 60 yrs., g.r. 3*l.* 4s., r. 25*l.* 330
Leyton.—Grove Green-rd., f.g.r.'s of 9*l.* 10s., reversion in 82 yrs. 260
South Woodford.—Maybank-rd., York Villa, f., e.r. 38*l.* 465
Hackney.—Tuilerie-st., f.g.r.'s 10*l.* 17s., reversion in 26 yrs. 550
Islington.—69 and 71, Orchard-st., u.t. 20 yrs., g.r. 3*l.* 200
East Dulwich.—14 to 24 (even), Cornflower-ter., u.t. 79 yrs., g.r. 30*l.* 1,100
Hackney.—57, Tudor-rd., u.t. 32 yrs., g.r. 4*l.* 10s., r. 50*l.* 305

By HAWKINS & EDGECOMBE.

Clapton.—77, Powerscroft-rd., f., e.r. 55*l.* 680

By W. EYDMANN & SON.

Camden-rd.—58, Brecknock-rd., u.t. 46 yrs., g.r. 7*l.* 420

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.

TO CORRESPONDENTS.

M. & M., F. H. S. (Amounts should have been stated).—R. S. (Below our limit).

NOTE.—The responsibility of signed articles, letters, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under £100, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

AMBERLEY (Sussex).—For the erection of a block of cottages, for Messrs. Pepper & Son. Mr. H. Howard, architect, Town Offices, Littlehampton :—

Snewin Bros...	£1,751	Linfield & Son	£1,710
W. Wallis	1,747		

[All of Littlehampton.]

BARROW-IN-FURNESS.—For the construction of Stanley-road, for the Corporation. Mr. W. H. Fox, Borough Engineer, Town Hall, Barrow :—

F. Mackenzie	£901	8	3
J. Cleator, Barrow-in-Furness*	£48	16	1

BEDFORD.—For the execution of paving works, Sandhurst-road, and others, for the Urban Sanitary Authority :—

Sandhurst-road, Ridgmount-street, and Derwent-place.

Litchfield & Son	£760 0 0	G. T. Jarvis, Bedford*	£593 18 6
R. Black	700 0 0		

St. Paul's-square.

Patent Victoria Stone Co.	£183 12 2	G. T. Jarvis, Bedford*	£139 17 0
R. Black	170 0 0		

BELFAST.—For the execution of sewerage works, &c., Balmoral District, for the Corporation. Mr. J. C. Bretland, City Surveyor, Town Hall, Belfast. Quantities by Mr. Acheson Ferguson, Wellington-place, Belfast :—

W. H. Campbell, Belfast* £4,791

BELFAST.—For laying water-main, Knockbracken, 1st Section, Contract No. 27, for the Water Commissioners. Mr. L. L. Macassey, C.E., Westminster and Belfast. Quantities by Mr. Acheson Ferguson, Belfast :—

J. & W. Stewart	£10,242 0 0	T. McMurray & Lanerty	£5,859 0 0
Patterson & Son, Ltd.	8,392 13 5	Sons	5,585 16 0
Fisher & Lefanu	7,529 7 6	H. & J. Martin, Ltd., Belfast*	4,058 0 0
		J. Hemingway	2,725 0 0

BELFAST.—For the construction of two reservoirs, Old Park, for the Water Commissioners. Mr. L. L. Macassey, C.E., Westminster and Belfast. Quantities by Mr. Acheson Ferguson, Belfast :—

Patterson & Son	£19,914 16 6	Fisher & Lefanu	£13,379 13 10
J. & W. Stewart	15,456 0 0	H. & J. Martin, Limited	12,590 0 0
T. McMurray	14,686 0 0	Courtney & Co., Belfast*	11,998 0 0
J. Hemingway	14,370 0 0		
Lanerty & Sons	14,000 0 0		

BERWICK-UPON-TWEED.—For the erection of printing-rooms, &c., High-street, for Mr. H. R. Small. Mr. J. L. Miller, architect, 39, Hide-hill, Berwick-upon-Tweed :—

Masonry.

Gray & Son, Berwick-upon-Tweed*	£720	James Russell	£718
		H. Elliot & Son	710

Joinery.

Henderson Bros.	£345 0	Charles Mace, Berwick-upon-Tweed*	£330 14
A. C. Burn	345 0		
John Ord	338 0		

Slating and Plastering.

A. Sidey	£140 10 0	T. Rule & Son, Tweedmouth*	£100 0 0
Turner & Son	132 8 5		
Thos. Renwick	120 0 0		

Plumbing.

Geo. Macadam £103

Gasfitting, &c.

John Percy	£101 5 0	Wilson & Son, Berwick-upon-Tweed*	94 0 0
D. A. Lamb	99 10 0		
George Smith	97 14 6		
R. W. Sidey	95 0 0		

All Trades.

Cockburn & Son £1,265

[Architect's estimate, £1,252. Mason work includes provisional sum for heating and ventilating.]

BERWICK-UPON-TWEED. — For the erection of houses, Ropery-lane, Greens, for Mr. R. Aird. Mr. J. L. Miller, architect, 39, Hide-hill, Berwick-upon-Tweed :—

Masonry.

Elliot & Son	£165 0	Gray & Son	£121 0

Slating and Plastering.

Thos. Renwick	£47 0	Rule & Son	£42 10
Alex. Sidey	43 10		

Plumbing.

R. W. Sidey	£30 5	Wilson & Son	£33 0

BURY (Lancs).—For additions to Egyptian Mills, Elton, for Mr. E. Milnes. Mr. C. H. Openshaw, architect, Fleet-street, Bury. Quantities by architect :—

Chas. Brierley	£1,400 0	Samuel Clough	£1,240 0
Chas. Lomax	1,400 0	Jas. Byrom	1,239 0
John Inman	1,370 0	Bury Saw Mill Co.	1,230 0
John Hall	1,350 0	J. Fletcher, Bury*	1,190 0
Thompson & Brierley	1,300 0	John Tinline	1,175 0
Thos. Newhouse	1,270 0	Smith Bros.	1,173 19

COLDSTREAM (N.B.).—For additions to North School, for the School Board. Mr. George Duns, architect, Duns, N.B. Quantities by Mr. Jas. D. Gibson, surveyor, Edinburgh :—

Building.—Adam Smeaton, Greenlaw*	£925 0 0
Joinery.—J. & A. Gray, Coldstream*	820 0 0
Plastering.—John Whitehead, Duns*	86 0 0
Plumbing.—A. Ford, Coldstream*	187 15 0
Slating.—Robert Rule, Coldstream*	122 0 3
Painting.—A. Hogarth, Coldstream*	51 17 3

CRAIGELLACHIE (N.B.). — For cutting track, and supplying and laying cast-iron pipes, for the Water Committee. Mr. Napier Landale, surveyor, Aberlour :—

J. McKenzie	£277 7 0	J. Milne & Son, Elgin*	£207 13 0
Petrie	218 0 0		
Ross Brothers	217 17 6	C. Stuart	205 0

DARWEN (Lancs).—For the extension of stables, Wood-street, for the Industrial Co-operative Society, Limited. Mr. J. B. Thornley, architect, 45, Market-street, Darwen. Quantities by the architect :—

T. Orrell	£2,190 0	Lloyd & Millward	£1,627 0
T. Lightbown	1,900 0	Whalley & Co.	1,568 6
Lord, Heaton, & Marsden	1,896 0	R. Shorrock, Union-street, Darwen*	1,550 0
John Knowles	1,775 0		

DEVONPORT.—For paving part of James-street, for the Town Council. M. J. F. Burns, Borough Surveyor, Municipal Offices, Devonport :—

C. L. Duke, Plymouth* £641 5

DEVONPORT.—For the erection of five blocks of buildings, for the Council. Mr. J. F. Burns, Borough Surveyor, 30, Ker-street, Devonport :—

T. King	£11,375 0	Wakeham Bros.	£8,354 0
Jenkin & Son	8,990 0	Goad & Co.	8,297 0
J. Crockerell	8,960 0	H. E. Skinner	8,202 0
T. May	8,628 0	Lethbridge & Son	7,998 0
A. N. Coles	8,500 0	S. Roberts	7,994 8

FARNBOROUGH.—For the erection of cottage at sewage farm, for the Urban District Council. Mr. R. Walter Knapp, surveyor, Town Hall, Farnborough :—

C. E. Norton* £207 10

GUISBOROUGH.—For the execution of street works, Back Thomson-street, for the Urban District Council. Mr. B. Dunning, surveyor, Fountain-street, Guisborough :—

Francis Young, Wilson-street, Guisborough.

No. 1.	£62 5 10	No. 4.	£40 1 9
,, 2.	6 0 0	,, 5.	124 10 3
,, 3.	65 9 10		

HERTFORD.—For erecting a new factory at Hertford for Messrs. Gilbertson & Page. Mr. James Farley, architect, Hertford :—

S. Redhouse	£3,490	Guin & Son	£3,175
Merridew & Wort	3,386	Lawrence & Son, Waltham Abbey*	3,049
E. R. Kemp	3,265		
Norris & Son	3,254		

LEYTONSTONE.—For building cottage, Norman-road, Leytonstone, for Mrs. S. Needham. Mr. J. G. Needham, architect, 18, Lower Clapton-road, N.E. :—

Taylor Bros.	£497 10	E. Jenner, Wanstead*	£340 0
Ridgway & Sons	425 0		

LONDON.—For painting and cleaning at the North Eastern Hospital for Children, Hackney-road, N.E., for the Committee :—

J. V. Olver, High-street, Kingsland* £244

LONDON.—For re-decorations at No. 45, Warrington-crescent, Maida Vale, W., for Mr. Nathaniel Abrahams. Messrs. Clark & Hutchinson, architects, 28, John-street, Bedford Row, W.C. :—

A. V. Paddison	£343	Bruton & Son	£260
Hayward & Son	315		

LONDON.—For alterations and repairs to the "Freemasons' Arms" public house, Salmon-lane, Limehouse, E., for Mr. Wm. Dean. Mr. J. G. Needham, architect, 18, Lower Clapton-road, N.E. :—

G. E. Todd & Co., Hackney-road	£4,965 0 0
L. H. Jackson, Poplar	4,619 0 0
Ashby & Son, Union-court, E.C.	4,484 0 0
H. Cocks & Co., Bow	4,250 0 0
J. W. Maddison, Canning Town	3,900 0 0

Gasfitting.

Jas. Steadman, Bethnal Green	£281 10 6

Pewtering.

R. Pringle, Brick-lane	£119 10 0
G. Rogers, Commercial-road	100 0 0

Seating, &c.

Platt & Son, Curtain-road	68 17 6

MANCHESTER.—For the rebuilding of shop premises in King-street, for Mr. R. R. Rothwell. Messrs. Maxwell & Tuke, architects :—

John Ramsbottom	£10,970	Neill & Sons	£9,510
Southern & Sons	10,878	John Bland	9,450
Henry Vickers	10,200	Peters & Sons, Rochdale*	9,047
Brown & Son	9,977		

NEWMARKET.—For erecting twenty-eight houses in Nat. Flatman-street, Newmarket. Mr. Jno. Flatman, architect :—

Kerridge & Shaw	£8,354	Linzell	£6,377
Bly Bros.	6,868	W. P. King	6,318
R. Hunt	6,812	Cowell*	5,976

[*See also next page.*

LOWESTOFT.—For the erection of schools, Oulton. F. W. Richards, architect, Stanley-street, Lowestoft. Quantities by architect :—

Youngs	£2,285 0 0	Barham & Swan	£1,758 0 0
J. P. Smith	2,177 0 0	J. Beckett	1,664 15 0
Ashby	2,135 0 0	W. Scarle, Carlton Colville*	1,525 10 0
Atterton & Earle	1,900 0 0	Kemp & Turner	1,430 11 6
Chapman & Son	1,850 0 0		
R. C. Cole	1,784 0 0		

PENMAENMAWR (North Wales).—For the execution of sewage works. Capelulo, for the Urban District Council. Mr. Ernest Worrall, surveyor, Council Offices, Penmaenmawr. Quantities by surveyor :—

Sheffield & Thomas	£3,848	Morney & Co., Manchester*	£3,536
F. D. Chantrey	3,725	Hughes & Rowlands	3,510
Underwood Bros.	3,713	Thomas & Jones‡	2,907

‡ Incomplete.

PONTEFRACT.—For the erection of three houses and shop, Monk Hill-lane, for Mr. J. Robinson. Mr. C. Keyworth, architect, Bank-chambers, Pontefract :—

Bricklaying.—H. Taylor*	£250 0
Joinery.—J. & C. J. Gelder*	163 0
Slating.—G. Spurr*	38 0
Plumbing.—W. Pearson*	47 0
Plastering.—J. Shaw*	36 0
Painting.—Burton & Son*	11 10

[All of Pontefract.]

ST. ALBANS.—For additions to premises, Victoria-street, for the Corporation. Mr. George Ford, City Surveyor, St. Albans :—

J. & W. Savage	£333 14
Eyra Dunham, St. Albans*	310 0

SHOEBURYNESS.—For the erection of house and shop, for Mr. J. Lynch. Mr. W. Y. Hobbiss, architect, 57, High-street, Southend :—

E. West	£900	Bullock & Son	£630
F. & E. Davey	795	Harris & Rowe, Ltd., Shoeburyness*	610
A. J. Golding	741		
A. Ventris	637		

SOUTHEND-ON-SEA.—For covered playgrounds at Brewery-road Schools, for Southend-on-Sea School Board. Mr. W. Y. Hobbiss, architect, 57, High-street, Southend-on-Sea. Quantities supplied :—

Dupont	£676 0 0	A. J. Golding, Park-street, Southend-on-Sea*	£593 6 3
Ardley & Elvey	669 0 0		
Davis & Leaney	662 0 0		
Bullock & Son	650 0 0	Whur & Guiver	592 17 2

SOUTHEND-ON-SEA.—For addition of girls' school to Leigh-road Schools, for the Southend-on-Sea School Board. Mr. W. Y. Hobbiss, architect. Quantities supplied :—

F. & E. Davey	£5,679	Davis & Leaney	£5,067
A. E. Symes	5,490	Dupont, Southend-on-Sea and Colchester*	4,999
Shelbourne & Co.	5,420		

STRATFORD.—For building three tenement houses, Aldworth-street, West Ham-lane, Stratford, for Mr. C. A. Day. Mr. J. G. Needham, architect, 18, Lower Clapton-road, N.E. :—

Taylor Bros.	£1,550	A. Webb	£1,278
J. W. Maddison	1,490	E. Jenner, Wanstead	990
Thos. Emmett	1,350		

SWINDON.—For alterations and new premises, Devizes-road, Swindon, for Messrs. Chandler Bros. Mr. W. H. Read, architect, Swindon :—

C. Williams	£1,857 10 0	Liddington	£1,750 0 0
Flewelling & Huckson	1,847 0 0	A. J. Colborne*	1,550 8 5
J. Williams	1,777 0 0	Crook	1,206 0 0

SWINDON.—For alterations and additions to No. 1, Commercial-road, Swindon, for the Swindon Permanent Building Society. Mr. W. H. Read, architect, Swindon :—

W. Dean* £480

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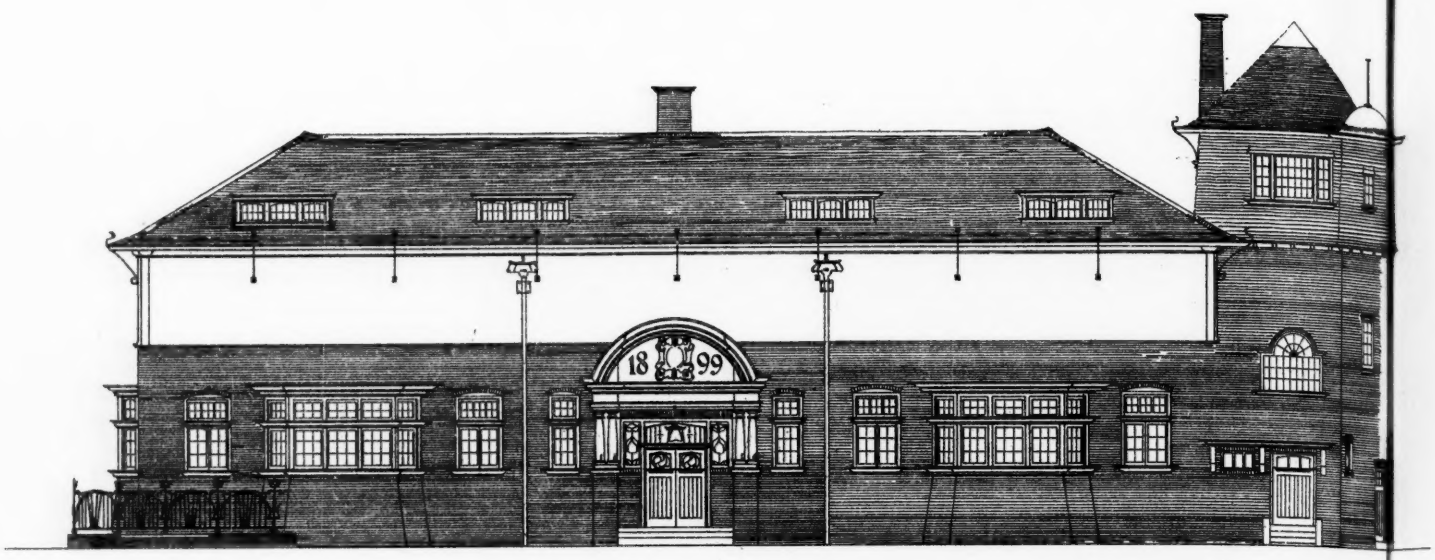

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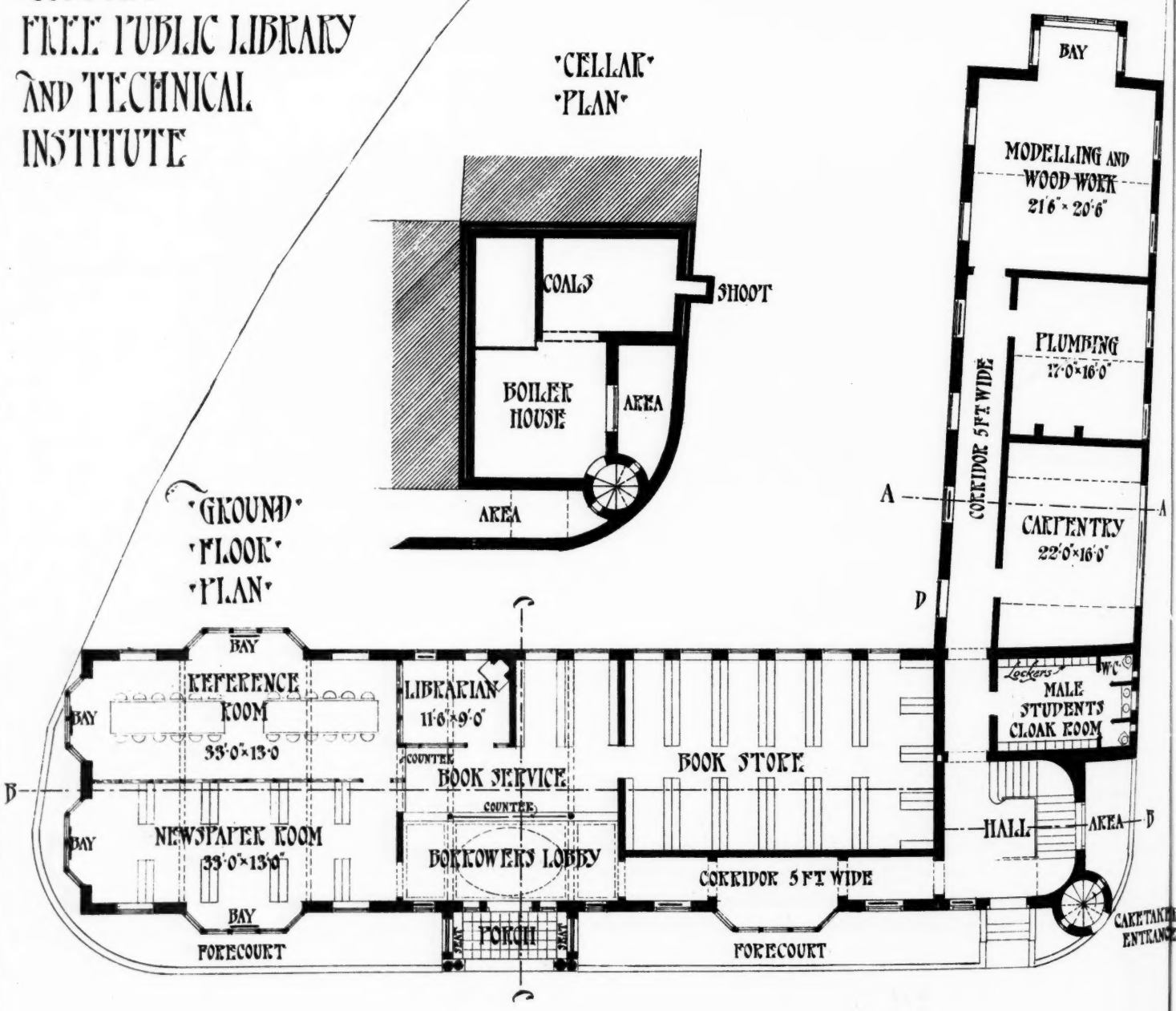

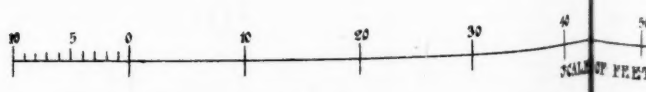

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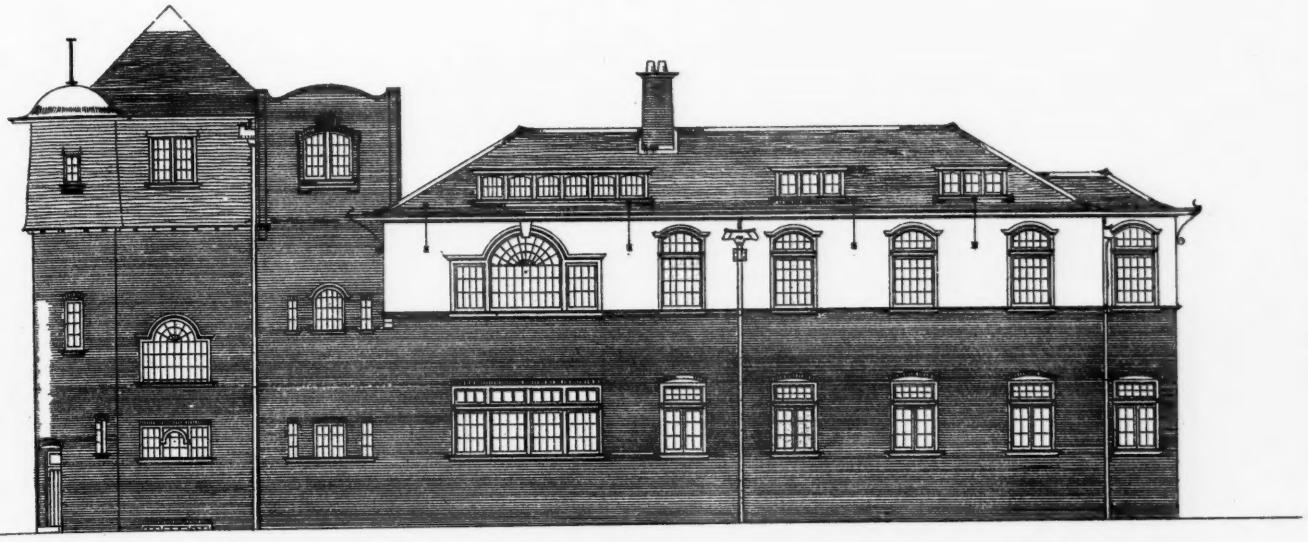

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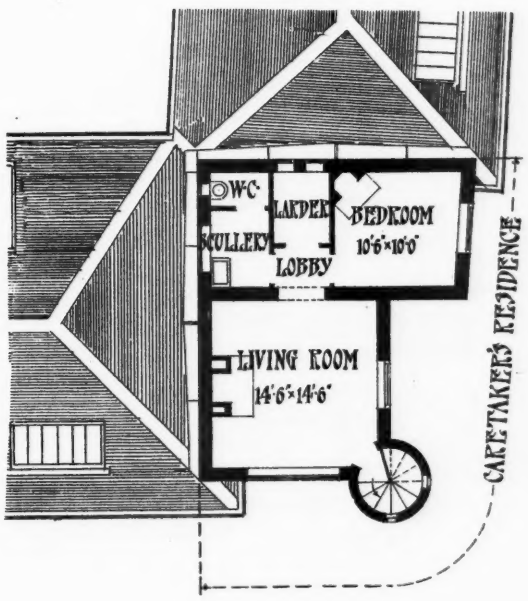
ROOF PLAN



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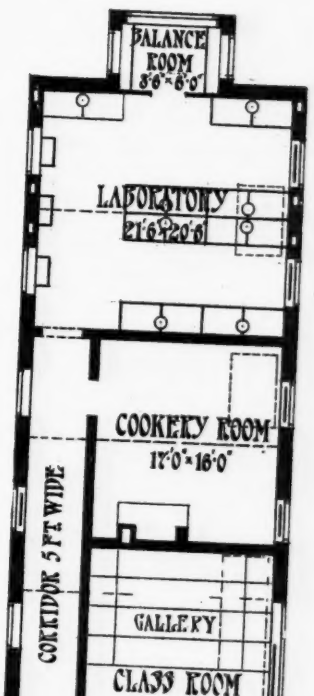

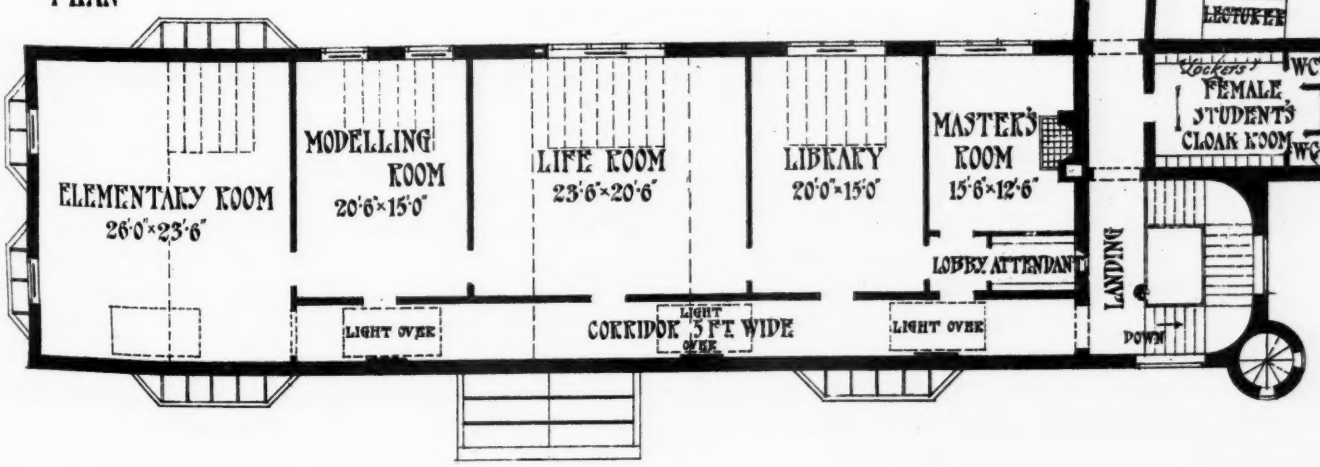

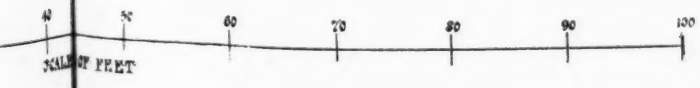

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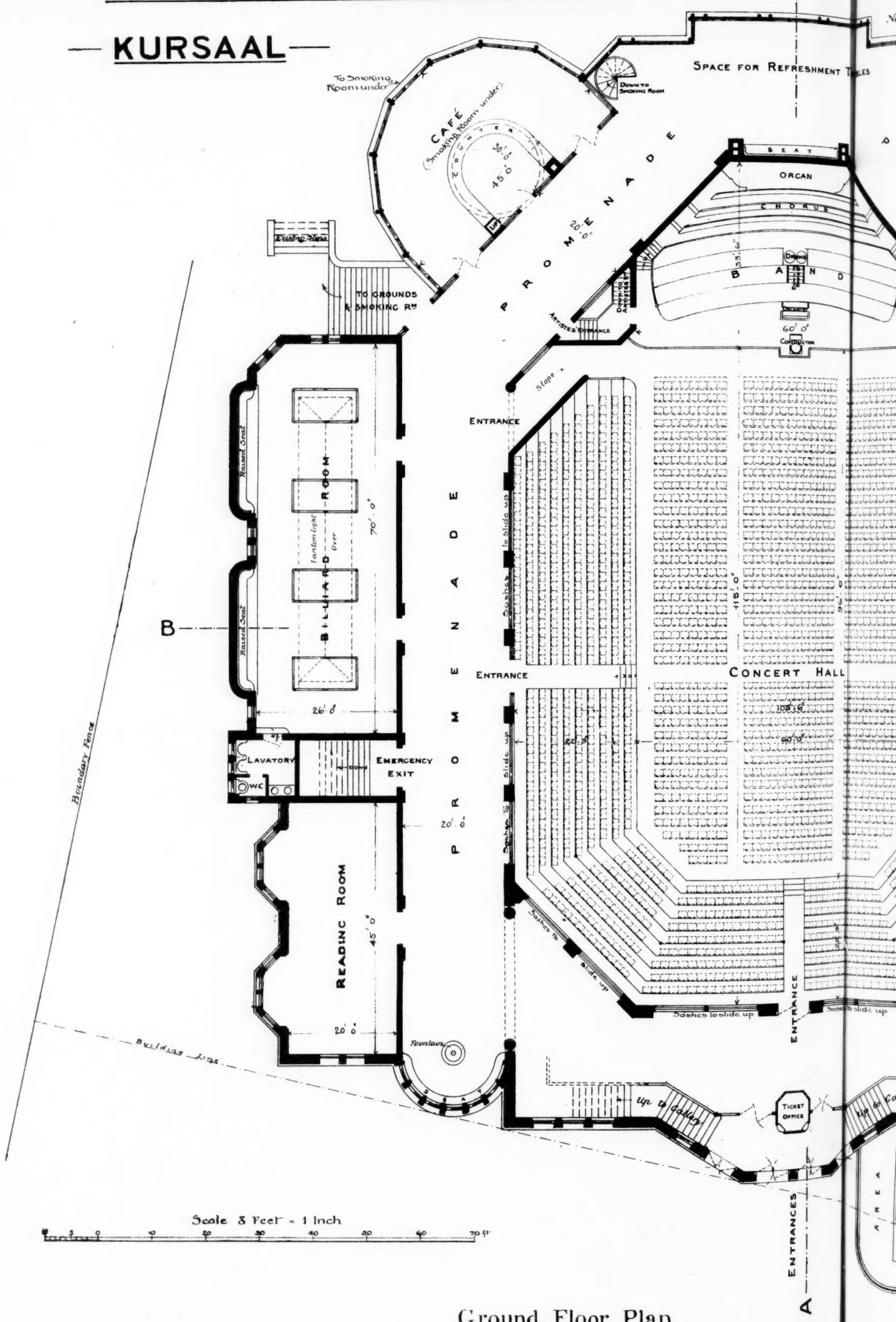
BOROUGH OF HARROGATE

KURSAAL



Ground Floor Plan

FIRST PREMIATED DESIGN FOR KURSAAL, HARROGATE

Note All these Windows slide up to 7ft 6in above Floor level

HMENT TABLES

REFRESHMENT ROOM
(Kitchen Site under)

COUNTER

LIFTS

45° 30°

PROMENADE

20'-0"

TO GROUNDS

DOWN TO ARTISTES' ENTRANCE

ARTISTES' ENTRANCE

Inclined Way

ENTRANCE

Sashes to Slide up

ENTRANCE

PROMENADE

20' 0"

Sashes to Slide up

Sashes to Slide up

Sashes to Slide up

Up to Gallery

Down to Gentlemens' Lavatory

TELEPHONE

10' 0"

Down to Gentlemens' Lavatory

LAVATORY

WC

WC

WC

WC

WC

WC

WC

LADIES' CLOAK ROOM

COUNTER

AREA

AREA

ENTRANCE

TICKET OFFICE

NEW PUMP ROOM

COUNTER

CONCERT ROOM

STAGE

REFRESHMENT Rm

PRIVATE Rm

STORES

B

BAND ROOM

LAVTY

LAVTY

WC

STAGE ENTRANCE

VOCALISTS Rm

MANAGERS ENTRANCE

PARLOUR

SITTING Rm

Seating Accommodation
New Concert Hall

Ground Floor	2292
Gallery	718
Total	3,010

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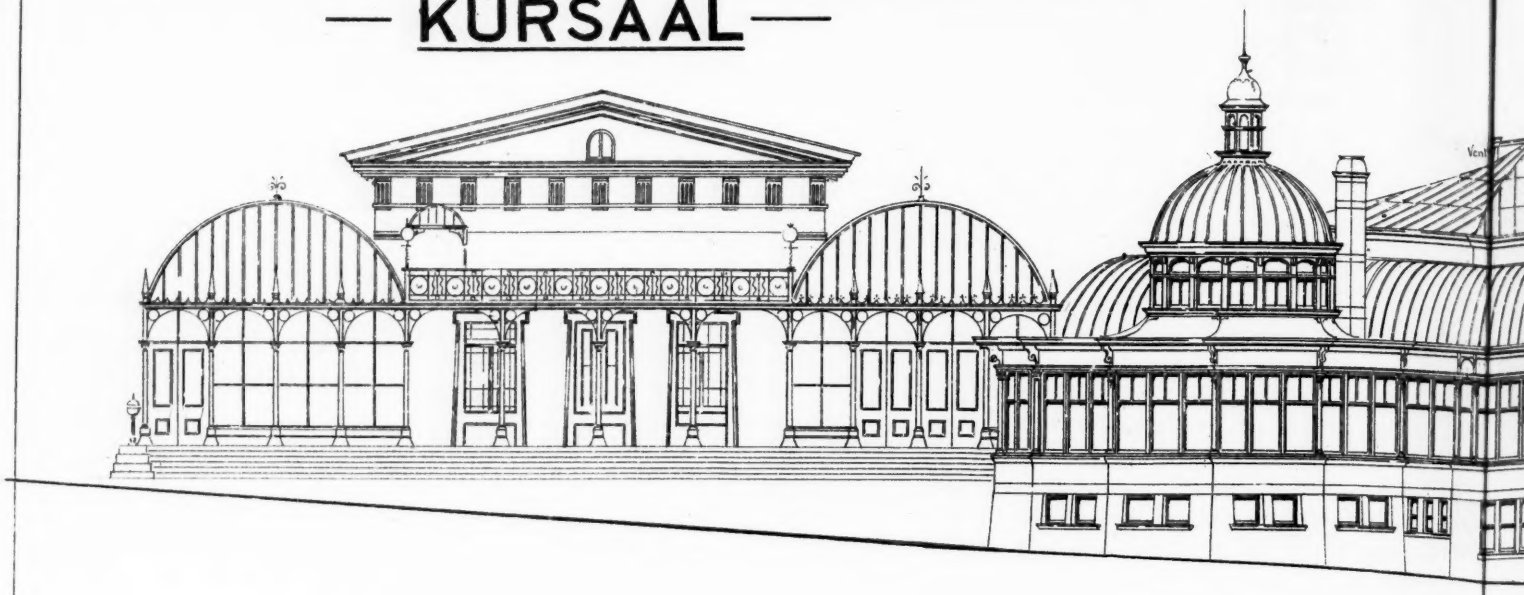
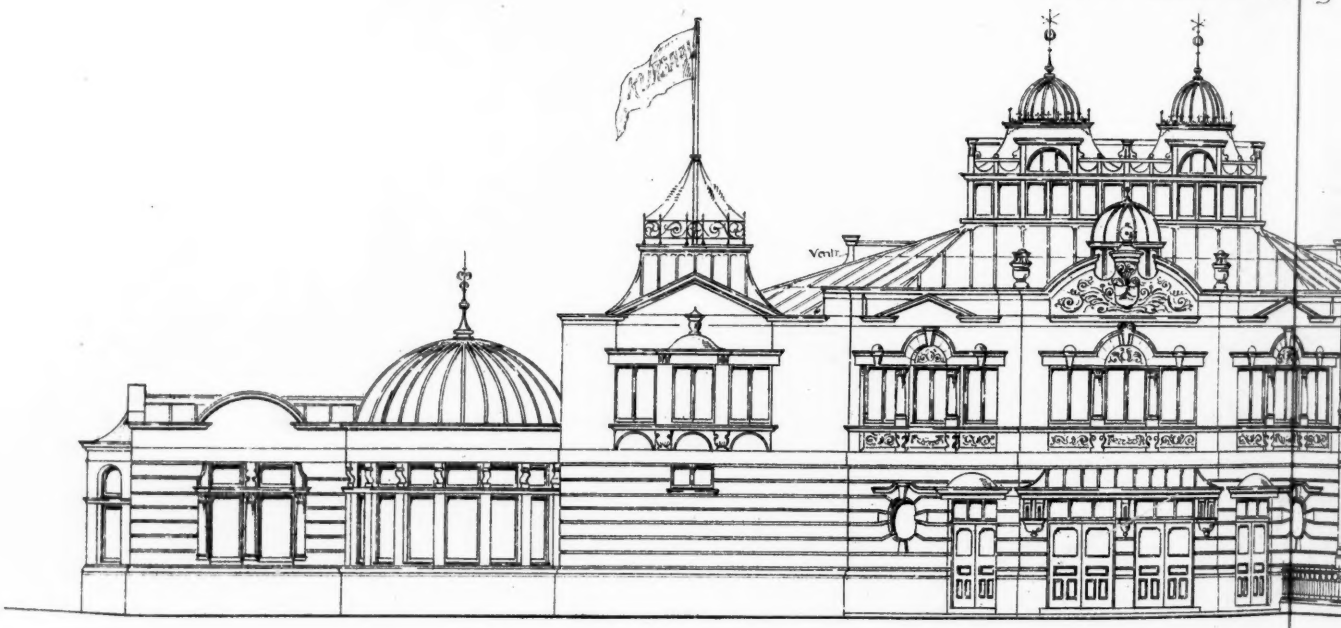
BOROUGH OF HARROGATE

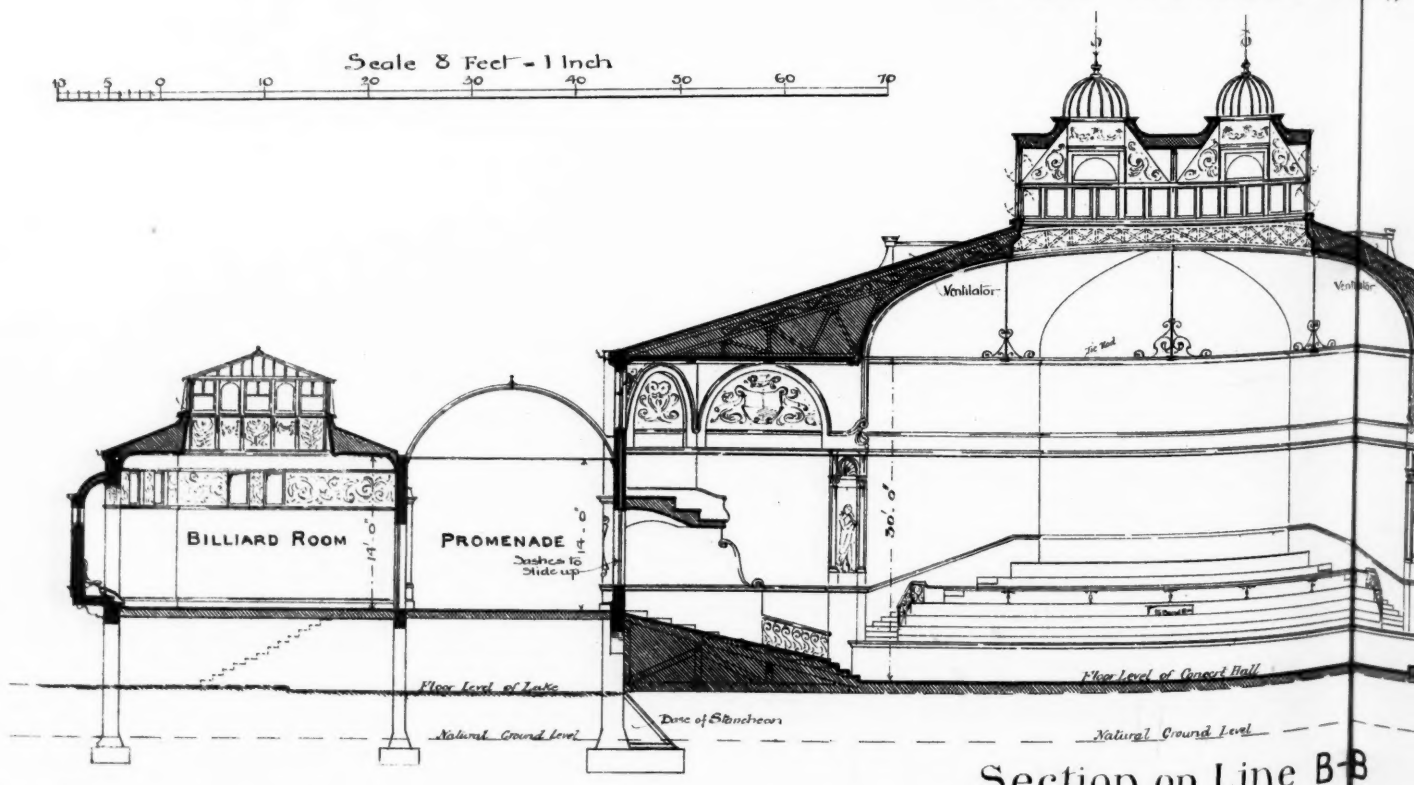
— KURSAAL —



Elevation facing



Front Elevation facing



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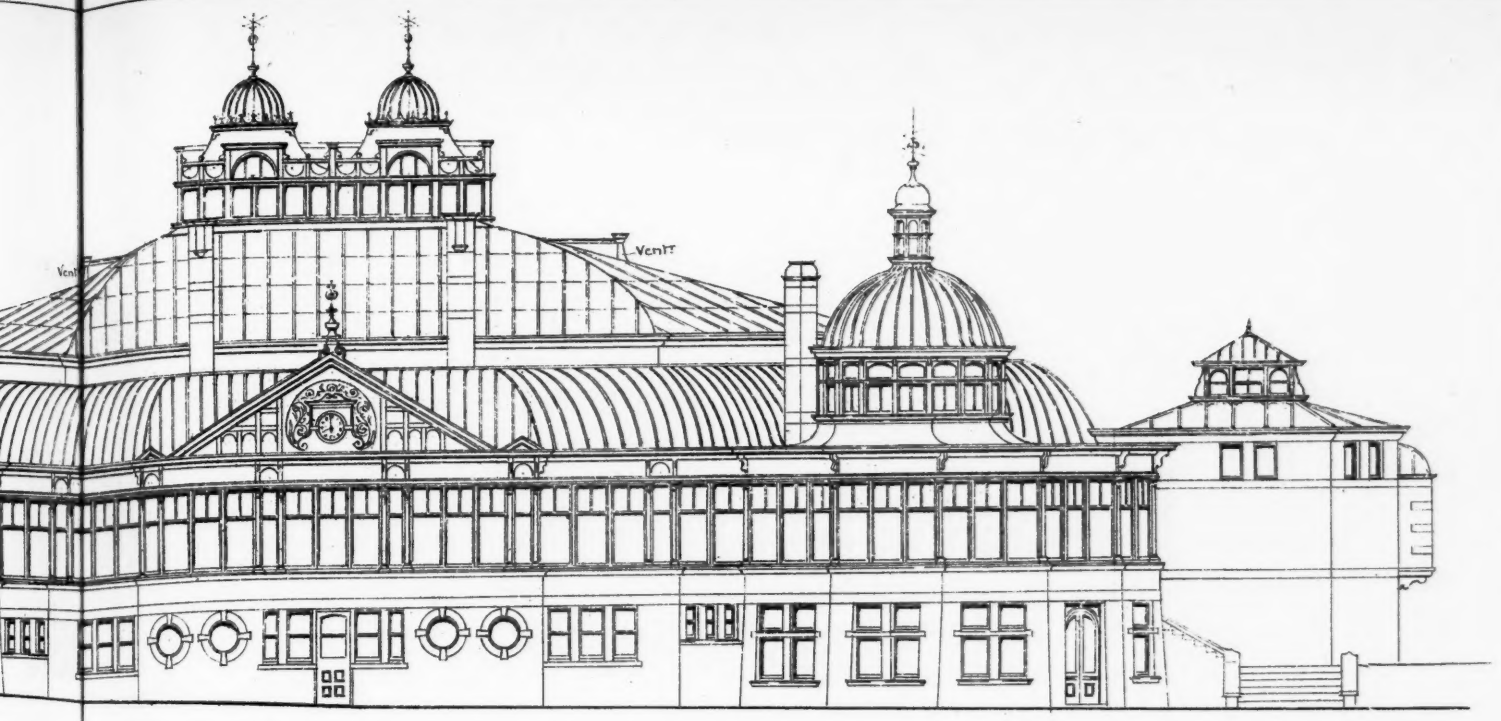
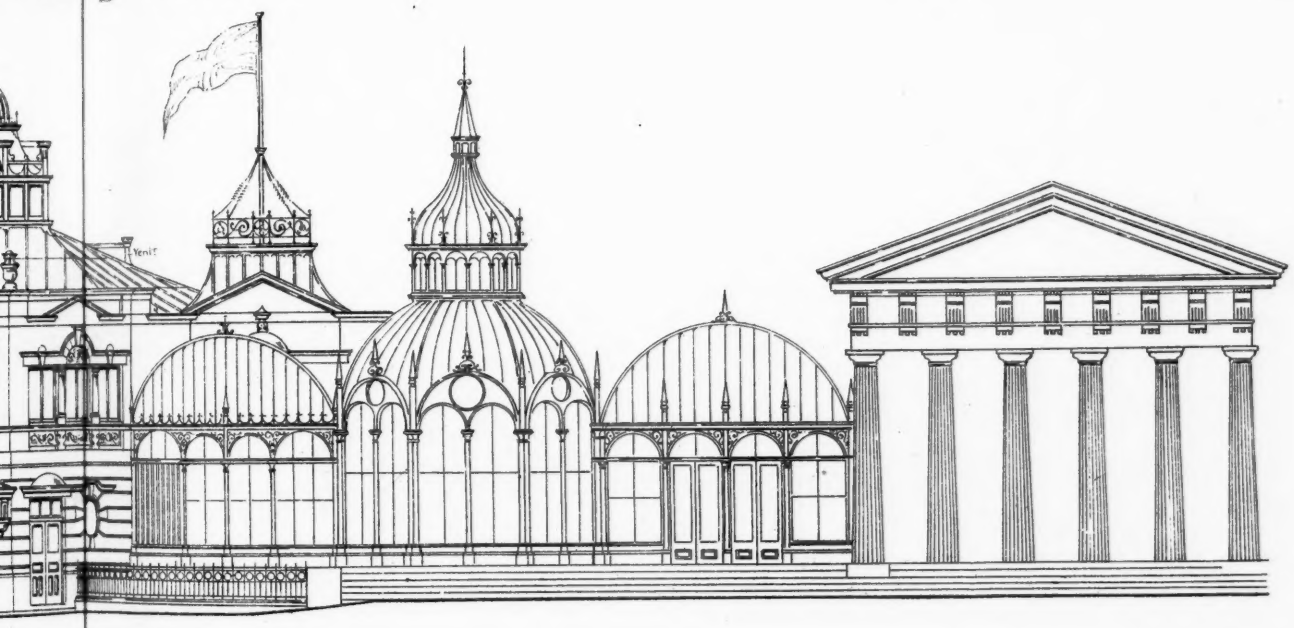
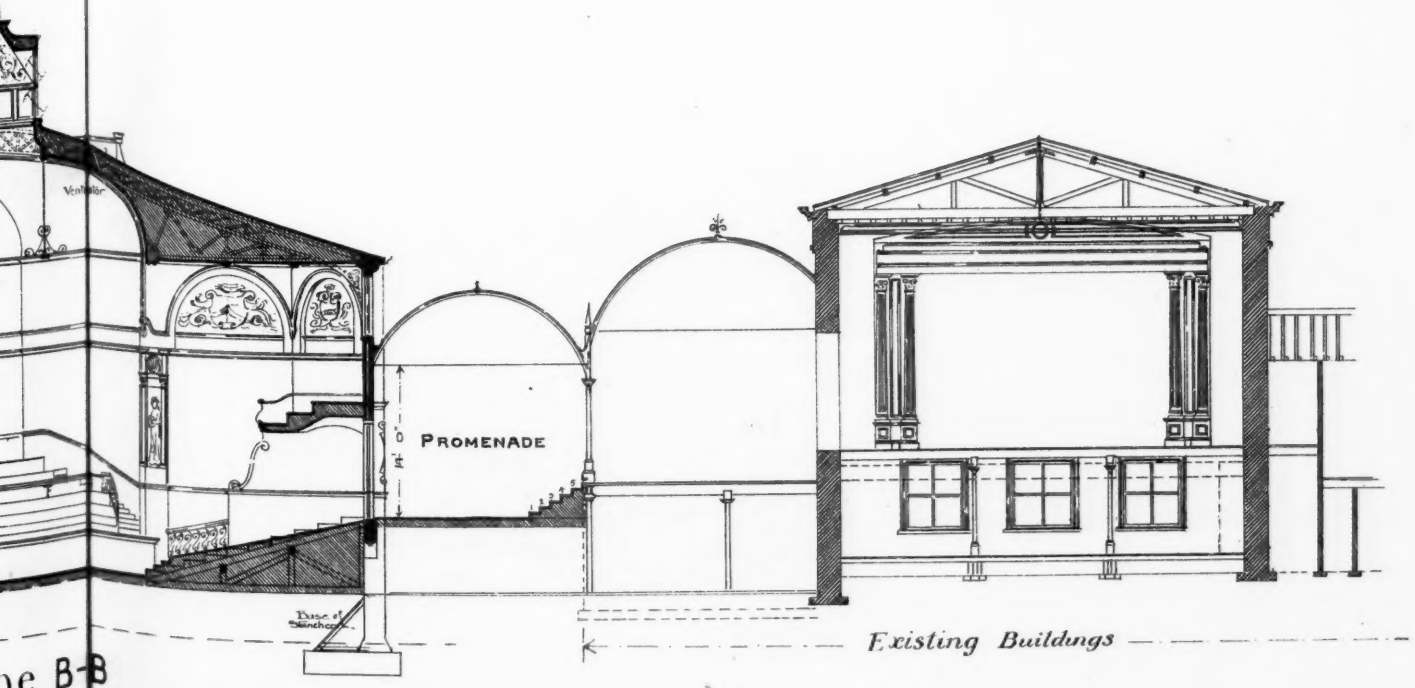


n facing Grounds



on facing Ripon Road



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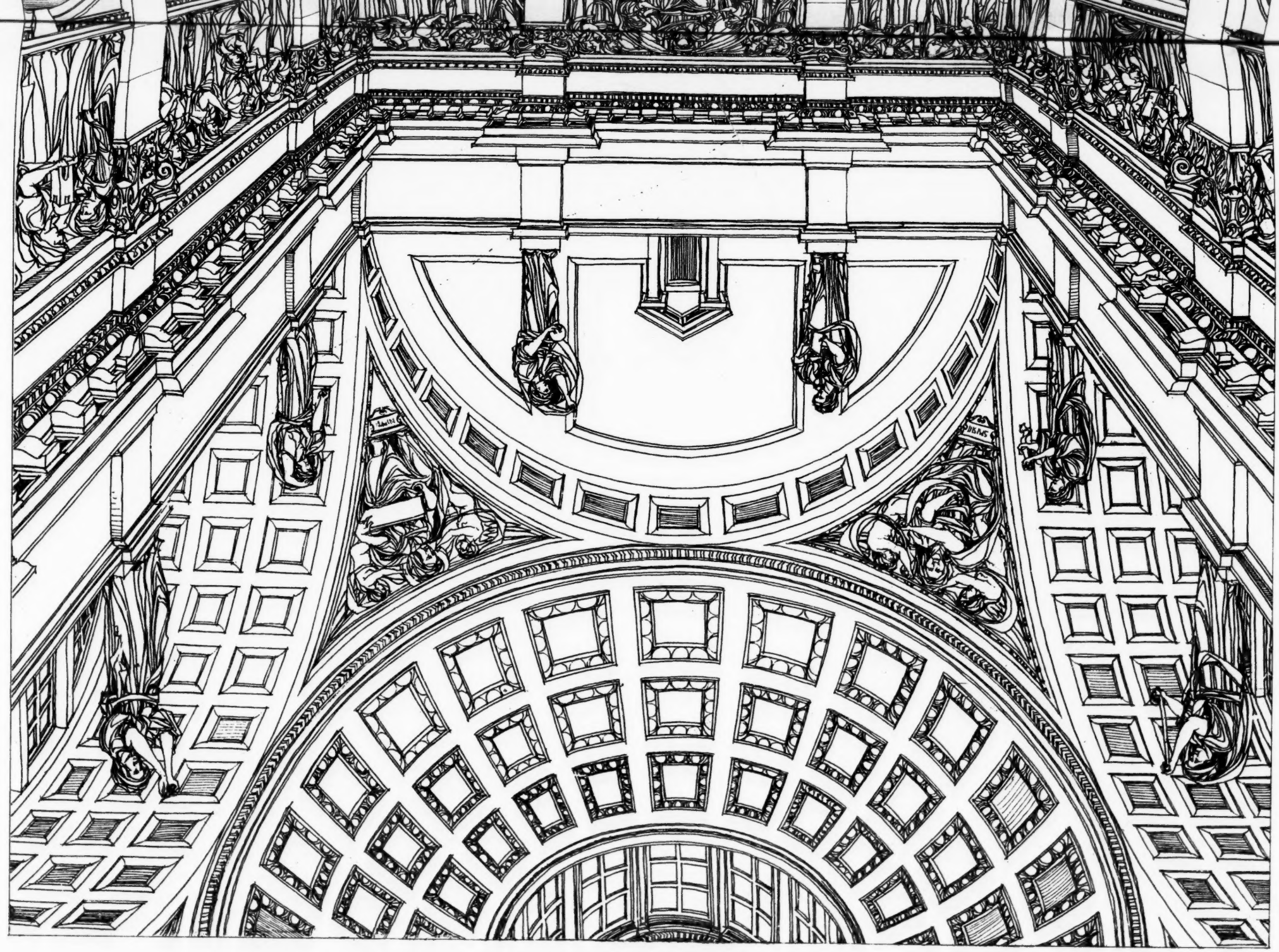

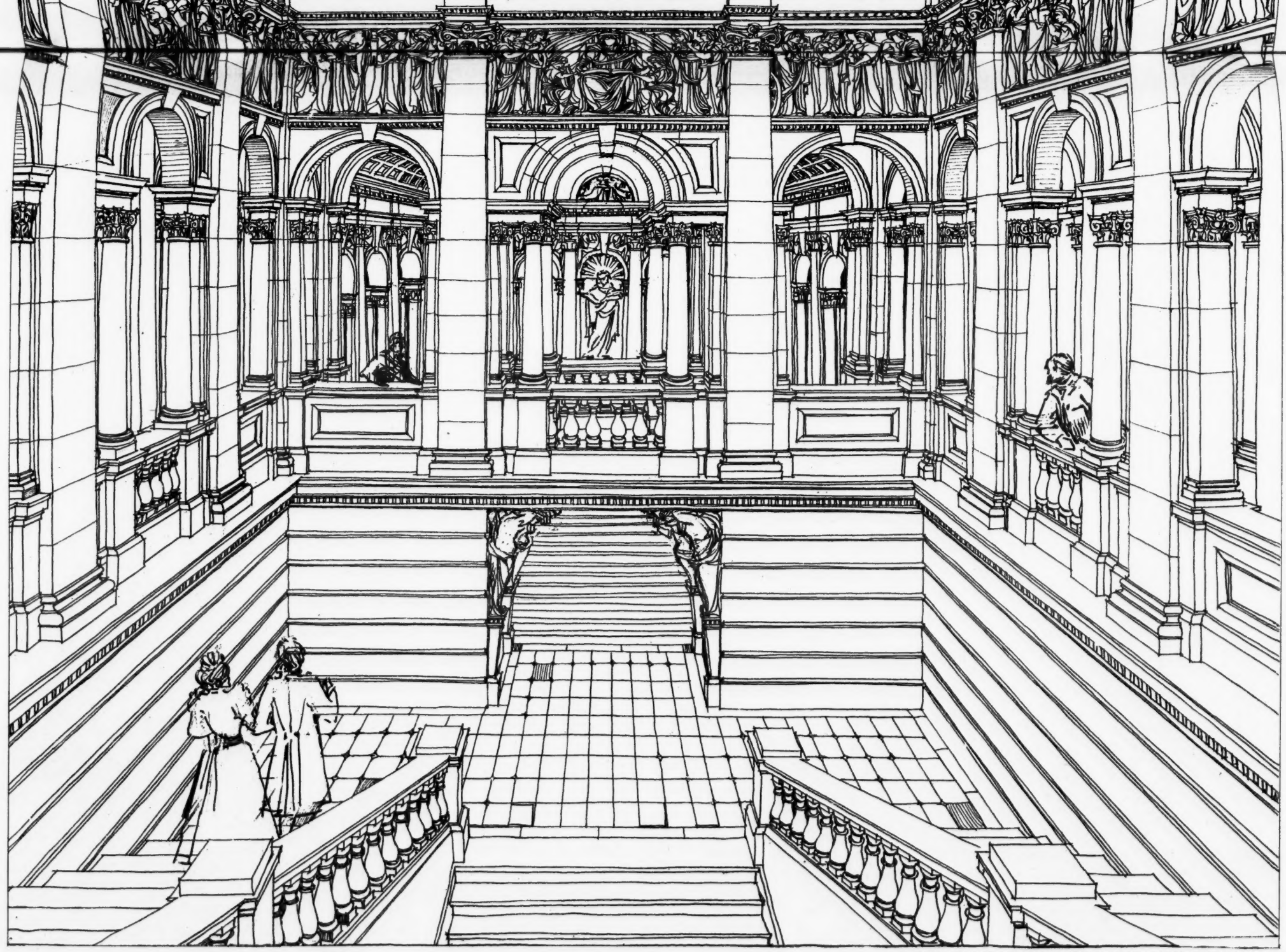

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